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## THE IRON AGE

MAY 25, 1939

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## Who Won the Coal Strike?

AFTER a labor controversy, such as the recent coal strike, dies through settlement or otherwise, it is interesting to hold a post-mortem. An investigation, if you please, to determine who won, if anybody, and who lost.

Offhand, we would say that John Lewis could be numbered among the winners, thanks to Presidential intervention. For John has been standing on pretty slippery footing in the courtyard of public opinion, and his feet might well have gone from under him had it not been for the timely application of the helping hand from Washington.

As it is, John wins the union shop, at least for some 80 per cent of the industry, which virtually means that he has won the closed shop, since any non-union or A. F. of L. miners in the "signed" plants must join the UMW within a stated time to hold their jobs.

So John has won a respite from the toboggan slide that his rapidly disintegrating labor empire was approaching, together with the prospect of the continuance of the dues money which came in so handy for past campaign contributions.

Next to John among the winners, we would pick out the oil industry. It has gained, as a direct effect of this latest attempt to seize a consuming public by the throat, what will be equivalent in annual oil sales to several million tons of coal, judging merely by announcements of conversions to oil burning already made. While sharing the winning honors with Mr. Lewis, the petroleum industry does so as an interested bystander and not as a contestant. It owes the gains that have been thrust upon it not at all to Washington and altogether to Mr. Lewis. It would be a nice gesture to send him a vote of thanks.

To the politically minded, with an eye to 1940, Washington may be classed among the winners. Certainly it would seem that two rescues performed in two different hours of need should have squared any campaign contribution and left something on the debit side for 1940.

Who lost the strike?

Offhand, we would say that the United Mine Workers rank and file were the principal losers. Not only did they lose some six weeks' pay, but what is more serious they face a recurring annual loss of perhaps as much through diversion of consumption from coal to oil.

It would indeed seem short-sighted labor leadership of an industry to drive consumers away from it through duress and thus penalize its workers. Americans won't tolerate dictators.

The coal industry has long been called a "sick" industry. Maybe it would be benefited by a change of doctors.

A Hausnest,

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SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS



By CARL F. JOSEPH\*

THE question of why different materials are used in the production of identical parts is asked a great many times. For this reason, it would seem appropriate to discuss the results obtained by substituting castings for certain forgings in the automotive and allied fields, and what the future has in store for the casting industry in such a direction.

In the choice of material for any part, there are a number of factors to be given consideration, as for instance, (1) what are the requirements in service? (2) can the material be produced uniformly? (3) what is the overall cost of the finished product?

Whether the choice be a casting or a forging is in many cases a matter of personal opinion. Of course, many engineers are steel minded, and the choice of a casting would be furtherest from their consideration. But, it's true that stresses, method of fabrication, possible change in design, and equipment necessary often favor castings for many parts.

However, a plant equipped for machining a certain forging of a type which can be cast and ground more cheaply might find it difficult to change over to a casting due to the cost involved in scrapping good equipment.

On occasion, different accounting

\*Metallurgist, Saginaw Malleable Iron Division, General Motors Corp., Saginaw, Mich.

THIS metal, an arrested malleablized steel, combines the simplicity and adaptability of castings with strength and reliability similar to forgings. It is rapidly gaining favor for certain automotive applications, applications involving high stress and fatigue. The metallurgy, production practice, heat treating technique, physical properties and applications are all discussed herein.

methods in various plants using identical parts will account for the fact that a forging is used in one instance and a casting in another. This is especially true when the part in question is forged in the plant's shop. In this instance, if the part can be produced more cheaply as a casting in an outside plant, the overhead on the balance of the forgings would actually raise the cost of the remaining forgings. There-

fore, there would be some hesitancy in changing over to a casting. However, very often due to the obsolescence of existing equipment, any saving which can be made by the purchase of new equipment will interest engineers in the use of castings over forgings.

Notable savings in production costs. and in many cases a marked improvement in the quality of the product are the results obtained with a metal known to the trade as ArMaSteel (arrested malleablized steel). The metal is a duplexed cupola electric furnace material which is produced under the most exacting technical control. Very close chemical control is maintained from the raw materials to the finished product. The metal charge consists of 45 per cent high quality steel scrap, 11 per cent silvery pig iron, and the balance gates and sprues. The melted metal is tapped from an electric furnace at 2850 deg. F., after being refined and superheated. The

## TABLE I Properties of ArMaSteel, Oil Quenched and Drawn

	Properties of ArMaS	teel, Oil Quenched	and Drawn	
Ultimate		Per Cent		
Strength	Yield Point	Elongation in	Brinell	Hardness
Lb. Per Sq. In.	Lb. Per Sq. In.	in 2 In.	mm.	No.
108,000	95,000	1.5	3.6	285
105,000	90,000	2.5	3.7	269
95,000	82,000	4.0	3.9	241

analysis of the metal is as follows: Carbon, 2.65 to 2.75 per cent; silicon, 1.25 to 1.35; manganese, 0.38 to 0.42; sulphur, 0.15; and phosphorus, 0.05 per cent.

The properties of ArMaSteel compare favorably with steel castings and forgings in the 1035 range. The metal combines the simplicity and adaptability of a casting with strength and reliability similar to a forging. And in certain instances articles can be cast more economically from ArMaSteel than forged of steel.

The product is originally cast white, i.e., all of the carbon is in the combined state. It is then heat treated in such a manner that the graphitization is terminated at such a point as to allow sufficient combined carbon to remain to definitely affect the properties. The matrix of ArMaSteel can be controlled to contain combined carbon from very low percentages up to the eutectoid composition of about 0.65 per cent. The properties of ArMa-Steel differ as the matrices differthe higher percentage of combined carbon producing the stronger, harder. less ductile and more difficult product to machine. Due to the incomplete graphitization of ArMaSteel, the shrinkage from pattern size is slightly greater than that of malleable iron. This shrinkage depends upon how much combined carbon is present in the iron, but generally the same pattern shrinkage as for malleable iron castings, i.e., 1/16 in. per ft. is used.

The combined carbon in ArMaSteel is present as a sorbitic structure and also in the form of minute spheroids of iron carbide imbedded in the matrix of the iron. When heat treated, martensite, or some other form of decomposition product of austenite, will be produced. Just as a steel treater heat treats tool steel, i.e., quenches it rapidly in oil or water to obtain hardness and "draws back" to temper or remove strains, so ArMaSteel also can be treated. With ArMaSteel, the timetemperature factor is important, due to the reabsorption of carbon as the temperature and time are increased.

The development work on metal such as ArMaSteel dates back some 15 years. Early experimentation was given practically no encouragement by engineers, and it has been only during the past few years that any real progress has been made in production of



F IG. 1—Section of a hardened ArMaSteel cam shown above. The micrographs arranged in a V are at 100 diameters, and show the surface at the top, the gradation zone in the middle and the core at the bottom. This cam tested 65,000 lb. per sq. in. yield, 85,000 lb. ultimate, 5 per cent elongation, and 196 tc 217 Brinell, with 60 Rockwell C on the surface. The total carbon was 2.70, combined carbon 0.49, manganese 0.40, silicon 1.25, sulphur 0.16, and phosphorous 0.05.

the product. Most automotive engineers and metallurgists are inclined to put aside the marked improvements in metallurgy as applied to foundry

operations, which have been developed in the past decade. Foundry practice for years has largely been an art rather than a science, but lately science is far more prominent.

There has been a tendency in recent years to replace certain forgings by castings in the automotive field and in other industries. This competition is in the spirit of progress, and benefits both the car producer and purchaser. A great advantage in favor of castings is the possibility of placing metal exactly where it will do the most good. This eliminates considerable machining. Constant pressure brought

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on by engineers and foundrymen to reduce weight, increase physical properties and cut manufacturing costs has stirred the inventive faculties of the metallurgist to the highest pitch, and in many cases has caused him to venture into hitherto unexploited fields to find new uses for castings, uses which have often been considered outside of the range of practical accomplishment.

ArMaSteel has large potential outlets due to a wide range in physical properties made possible by heat treatment. When soft it is quite easily machined. Comparative machining tests show that ArMaSteel has an advantage over steel bar stock and drop forgings of the same Brinell hardness. Reports from Saginaw Malleable Iron Division customers show from 20 to 40 per cent better machineability, with a 20 to 100 per cent increase in the number of castings per tool grind. Furthermore, ArMaSteel parts take a fine machine finish with a high polish.

Experience in machining of ArMa-Steel rocker arms has shown that the material machines better at a lower r.p.m., using a greater feed. This part is now being machined at 303 r.p.m. drill speed with a production of 1000 or more castings per tool grind.

A 25/32-in. drill is used for this operation, and at 303 r.p.m. this gives a stock removal of 0.011 in. per revolution. The rocker arms formerly were made from steel forgings, which were machined at 520 r.p.m., with a stock removal of 0.0064 in. per revolution. At this drill speed, 500 to 600 castings per tool grind were obtained. In other words, ArMaSteel must be machined at lower r.p.m. with a greater feed to increase the number of parts per tool

grind over a similar part made of steel.

In turning a 2-in. bearing on a certain camshaft forging, the part was machined at 134 r.p.m., with a 0.011-in. feed. On ArMaSteel this has been changed to 90 r.p.m., using a 0.019-in. cut per revolution. This particular camshaft was formerly a 1045 forging. The present ArMaSteel camshaft offers no machining trouble, and machines considerably better than the forging.

Another comparative machining test between a 1145 steel forging and Ar-

MaSteel was made on a universal joint voke. The splinning operation on the forging at 3.8 to 4.0 mm. Brinell gives considerable trouble and produces a chatter on the tool. The broach load on the forging was 11,000 lb. against 5500 lb. on the ArMaSteel. Another lot of forgings was tested against ArMa-Steel at 3.6 mm. Brinell, and the load on the broach was between 11,000 and 12,000 lb. on each lot. From this it can be seen that Ar-MaSteel can be broached with considerable less

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wear on tools, since the loading on the tool is directly proportional to the machineability of the metal.

Selective hardening can be successfully applied to this metal, either by the high frequency induction method (such as the Tocco process), the use of oxy-acetylene flame for flame hardening, or by immersing in a heating medium such as lead or salt bath. Cams on a certain camshaft are hardened by the former method in 13 sec. This cycle is 4 sec with current on and 4 sec. with current off, which allows the heat to run to the nose of the cam, and 5 sec. water spray quench. This produces a surface with a minimum hardness of 75 scleroscope. Photomicrographs of a cam so hardened, showing the three zones, are reproduced in Fig. 1. Micrographs of a treated rocker arm and connecting rod are shown in The ArMaSteel shifter fork on one make of car is flame hardened by applying the heat to the surface to be hardened for a period of 10 sec., followed by a water quench. This produces a file hard surface.

On another car the ArMaSteel rocker arm pad is allowed to remain 15 min. in a lead bath held at 1550 to 1575 deg. F. and quenched in oil. The pad end is immersed in the lead to a depth of ¾ in. and the remaining portion of the arm is not heated, therefore, not affected. It has been possible to eliminate the use of a bushing on

F 1G. 2—ArMaSteel connecting rod (left) at 500 diameters; quenched in air from 1650 deg. F., reheated to 1600 deg. then held 20 min. and quenched in oil, with a final draw of 1.5 hr. at 1250 deg. Final Brinell was 4.0 mm. On the right is a section of rocker arm at 100 diameters; air quenched from 1650 deg. F. and drawn at 1250 deg. for 8 hr. Final Brinell of 4.50 mm.

this part since it has been found that no wear occurs between the ArMa-Steel rocker and the hardened rocker arm shaft.

Nitriding has been successfully applied to ArMaSteel. This metal when treated 3 hr. at 1390 deg. F. in an atmosphere of carburizing gas and ammonia, gives a shallow case of approximately 0.004 in. This has been found to be very satisfactory on such parts as shifter forks and small gears. No distortion from water quenching at this temperature has been observed.

With steel, a hardness of 62 to 65 Rockwell C is file hard. ArMaSteel of much lower Rockwell C reading will resist a file and wear better. As low as 55 Rockwell C produces a file hardness equivalent to the 62 of steel. Generally, however, a minimum of 56 to 58 Rockwell C is necessary to produce a genuine file hardness. Results

of many tests have demonstrated to the author's company that the wearing qualities of ArMaSteel at 52 to 55 Rockwell C are superior to steel at 62 to 65 Rockwell C. These tests were conducted on camshafts and rocker arms. Specifications on Tocco hardened ArMaSteel cams call for a minimum scleroscope of 75, or 55 Rockwell C. Hardened pad ends of rocker arms are held to a minimum of 50 Rockwell C.

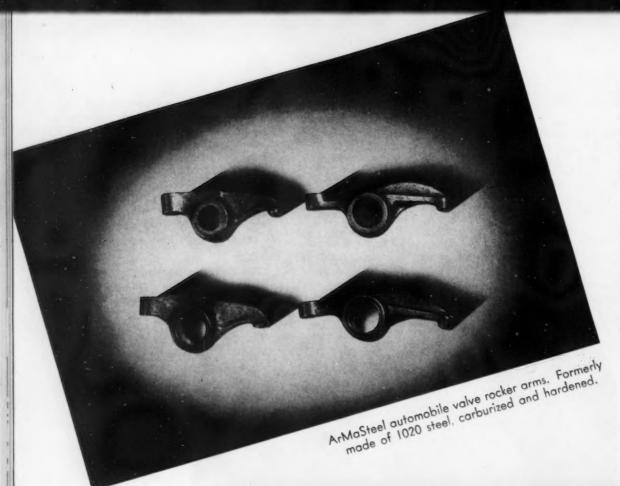
The correct quenching temperature and medium to be used on a particular part to be treated must be given care-

ful consideration. The lowest temperature and shortest time at quenching heat for hardening produces the best results on parts which are prone to crack. Also quenching in oil rather than water is generally befter on complicated castings, especially if the heat treating is per-formed on the machined part, which has sharp corners and changes in sections. Oil quenching produces, (1) less distortion, (2) shallow hardening which will add to the toughness of the core and aid in

straightening, (3) freedom from cracks, and (4) more uniform surface hardness and in many cases a higher Rockwell hardness than does water quenching. A 1 in. section of Brinell 3.9 to 4.2 mm. held at 1550 deg. F. for 30 min. and then quenched in oil will give a Rockwell C of 55 to 60. The same section held 20 min. at 1600 deg. F. and quenched in oil will give a Rockwell of 60 to 64.

ArMaSteel parts can be coined to exact dimensions, taking a reduction of about 2 to 3 per cent without cracking. This permits the casting of parts closer to dimensions.

In the making of forgings, a sevendegree draft is generally allowed for ease in working the dies. Solid sections must be machined out. Parts made from ArMaSteel have only a two-degree draft, and very often holes can be cored out. This means



Steel pistons ran more than 700 hr. at maximum load against aluminum and gray iron pistons running a maximum of 200 hr. before failure occurred.

On an accelerated fatigue automotive connecting rod test ArMaSteel has stood up remarkably well. On a bearing, onehalf of which was undercut 0.011 in., using a load of 3750 lb., and the shaft rotating at 4500 r.p.m., a 20-hr. run is considered satisfactory. On a test run with ArMaSteel rod a number of bearings were burned out during the test but the rod continued without failure for a period of

AT RIGHT
Automobile camshafts,
six and eight cylinder.
Formerly type 1020
steel, carburized and
hardened.

less machining and a pronounced saving in metal. Also patterns are considerably less expensive than forging dies, and, if necessary, slight changes in design can readily be made.

The physical properties of ArMaSteel on the softer metal, such as rocker arms, are: 80,000 lb. per sq.

in. ultimate strength; 50,000 lb. per sq. in. yield point; 5 per cent elongation in 2 in.; and a hardness of 187 Brinell (4.4 mm.). On the harder metal which is to be selectively hardened, the properties are: 90,000 lb. per sq. in. ultimate strength; 56,000 lb. per sq. in. yield point; 3 per cent elongation in 2 in.; and a Brinell (3.9 mm.) hardness of 241. ArMaSteel, when oil quenched and drawn, will give physical properties in the neighbor-

hood of those shown in Table 1. Tocco hardened ArMaSteel camshafts have been removed from motors after 50,000 miles of service and have shown absolutely no wear. Selectively hardened rocker arms likewise after many thousands of miles of service show no wear. Diesel engine pistons made from ArMaSteel are said to outlast by far any other metal which has been tested to date. Tests made by the author's company show that ArMa-

66 hr. The test at this point was stopped and the load increased to 4750 lb. This is considered a very severe test, far more than a connecting rod would ever experience in a lifetime of service. The rod continued 6 hr. longer under this load, making a total of 72 hr. before failure occurred. This material is considered satisfactory for a connecting rod of automotive designand a number of motors are being equipped with ArMaSteel rods.

In the substitution of an important forging by ArMaSteel it has been found desirable to develop tests which will detect cracks, surface imperfections and other defects. Final inspection on certain castings is covered by the electric resistance method. Castings are cut up and etched microsections examined to guarantee sound parts at all times. At all times every-

burization; (5) better tool life; (6) easier straightening; (7) better production on existing equipment; (8) less finished weight; and (9) added quietness to motor due to the damping property.

The cams, gear and fuel pump eccentric are held to a scleroscope hardness of 75 and are checked one hundred per cent. The remainder of the

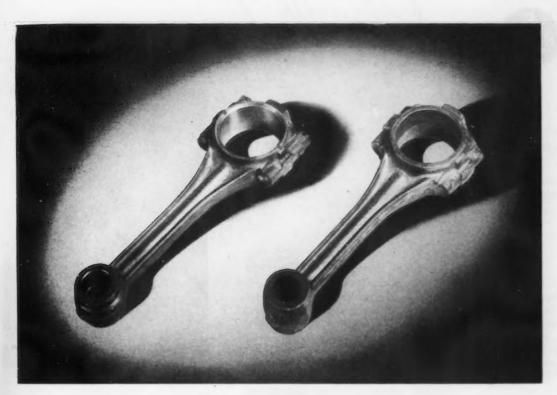
shaft is 217 to 241 on the Brinell test; 0.062 in, of stock is allowed for machining and grinding on the bearing, eccentric and gear, and 0.045 in, is allowed for grinding on the cams.

Applications of ArMaSteel cover a broad field due to the wide range of physical properties. The following parts are being used in the automotive, refrigeration and Diesel engine fields:

> crankshafts, camshafts, rocker arms, pistons, shifter forks, gears and many kinds of levers and brackets. Pictures of many of these parts are shown in the accompanying illustrations. And many other parts requiring shock resistance with high elastic limit, good wearing qualities and high fatigue resistance with good machineability, are receiving consideration from the engineer as a possibility for ArMaSteel.

Automobile connecting rod, which has tested very well. At present a type 1035 steel forging.

0 0 0 .



thing is done to produce a part which will perform as well or better than a forging.

Whenever there is a marked improvement in the quality of an automotive product, and the part can be produced at a saving, it naturally arouses the interest of the automotive engineer. This has been particularly true of the Ar-MaSteel camshaft.

Many advantages can be credited to Ar-MaSteel as a camshaft material; in addition to savings of pattern expense versus cost of forging

dies. These advantages are as follows:
(1) Elimination of rough machining of cams; (2) only one centering operation; (3) less metal removed in machining; (4) elimination of car-



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O one who had no prejudiced interest in any one of the many metals that are worked by casting, but whose interest was in the founding industry in general, there were two outstanding characteristics of the 43rd annual convention of the American Foundrymen's Association, held last week in Cincinnati.

First was the practical aspect of the numerous technical papers presented at the four-day meeting. Theory was wedded to practice in these papers in a manner that enabled every foundryman there to grasp immediately the influence of the subjects discussed on his own particular plant product and operation. The second impression was the universal acknowledgment of the important role that metallurgy plays in the development of the industry. The consistently high attendance at all of the three sessions that comprised the lecture course on "The Microscope in Elementary Cast Iron Metallurgy," given by R. M. Allen of Bloomfield, N. J., bore eloquent witness to this new appreciation. This course in the use of the microscope was by far the most popular feature of the convention. Unfortunately, space does not permit dealing with Mr. Allen's "classes" as thoroughly as they deserve. Suffice it to say that the lectures were all very thoughtfully prepared, were comprehensive in scope, yet clothed in a language readily understood by the men to

whom the course was primarily directed. The material used in the lecture course has been published in book form and is available from AFA headquarters in Chicago.

## Washburn Elected President

On Wednesday there was a pause in the technical sessions long enough to hold the association's annual business meeting. Henry S. Washburn, past vice-president of the association and president and treasurer of the Plainville Casting Co., Plainville, Conn., was chosen president for the 1939 40 fiscal year, and Lester N. Shannon, vice-president of Stockham Pipe Fitting Co., was elected to serve as vice-president of the association.

The five directors chosen at the meeting are noted elsewhere in this report. On Wednesday morning the annual business meeting was held at the Hotel Gibson. Fred H. Clausen, president of Van Brunt Mfg. Co., Horicon, Wis., delivered this year's Board of Awards address. In his talk, Mr. Clausen pointed out that excessive taxes were a deterrent to the improvement of business activity which so many were looking for. He stressed the need of industry's taking heed of the new social and political conditions which are developing today and of adjusting their plant policies to these changes. On Wednesday evening the annual dinner was held in the Hotel Gibson and the Board of Awards announced



ESTER N. SHANNON, new vice-president of the American Foundrymen's Association, is vice-president of Stockham Pipe Fittings Co., Birmingham. Mr. Shannon has long been active in the association's work, having served as a director and the first chairman of the Birmingham Chapter.

the granting of the following medals for outstanding achievement in the foundry industry: The W. H. Mc-Fadden Gold Medal to Donald J. Campbell, president of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; the John A. Penton Gold Medal to Harold S. Falk, vicepresident and general manager of Falk Corp., Milwaukee, and the J. H. Whiting Gold Medal to James R. Allan, assistant manager of industrial engineering and construction of International Harvester Co., Chicago, J. E. Hurst, past president of the Institute of British Foundrymen, announced at the dinner that the E. J. Fox Gold Medal of the institute was to be awarded to Dr. Harry A. Schwartz of National Malleable & Steel Cast-

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## CASTING PROBLEMS





HENRY S. WASHBURN, new president of the American Foundrymen's Association, is president and treasurer of Plainville Casting Co., Plainville, Conn. He has served the association in the past in the capacities of vice-president and director.

ings Co., Cleveland. The presentation of this award will be made at the International Foundry Congress in London on June 13.

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## 60,000-lb.-Iron

A paper which received particular attention at the convention was that by E. L. Roth, president of Motor Castings Co., Milwaukee, which discussed the procedure for producing iron with a tensile strength of 60,000 lb. per sq. in. on a commercial basis. Most discussions of high strength irons in the past have involved a metal with a carbon content usually below 3 per cent. The iron described by Mr. Roth averaged 3.1 per cent carbon. The lower carbon irons always present a number of casting difficulties and

THE 43rd annual convention of the American Foundrymen's Association brought close to 1500 foundrymen to Cincinnati last week. Shop problems such as castability, gating, melting and pouring received particular attention at the meeting's numerous technical sessions, while high strength cast irons were again the subject of hypercritical probing.

were not always economically machineable in the smaller sized castings. Yet, according to Mr. Roth, he was able to cast small gears weighing 3 lb. each which possessed good machineability characteristics. The brinells on these gears ranged from 255 to 262. One of the larger castings made of this iron was a brake drum weighing 138 lb. This casting showed a brinell ranging between 248 and 269.

The cupola used in producing this 60,000-lb. iron measured 48 in. inside diameter and had a 3-in. continuous tuyere with 18 in. blocked off both in the front and in the rear of the cupola. The charges used, with the exception of the bed charge, consisted of 1360 lb. of steel rail, 195 lb. return scrap (high strength type), 45 lb. of silicon briquets and 12 lb. of manga-nese briquets. The standard analysis of this iron was 1.60 to 2.20 Si; 2.95 to 3.25 TC; 0.70 to 0.90 Mn; 0.12 maximum P: 0.09 maximum S: 1.50 to 1.75 Ni; 0.15 to 0.35 Cr; and 0.70 to 0.80 Mo. Mo, Cr and Si additions are made at the spout, while the Ni, in the form of preheated 5-lb. pigs, is added at the ladle.

The author's experience indicated that high temperatures were very necessary to successfully cast this type iron. Spout temperatures taken over a period of one year showed the lowest temperature to be 2810 deg. F. and the highest 2850 deg. F. The author made one test bar which was

poured at 2475 deg. F. The tensile of this bar was 49,640 lb., as against an average of 66,588 lb. on bars poured at an average temperature of 2640 deg. F. All the tensile specimens were standard 0.80 in. A.S.T.M. bars.

## Heat Treated Strengths Higher

Mr. Roth also investigated the influence of heat treatment on the strength of this iron. A number of standard bars were heated to 1550 deg. F., soaked 10 min. and then quenched in oil and drawn for one hour at varying temperatures. A maximum tensile of 91,600 lb. resulted with a 600 deg. F. draw, while beyond that (the investigation went up to 1000 deg. F.) the tensile strengths dropped.

Typical castings produced of this iron include gears, camshafts, crankshafts, brake drums, valve bodies and refrigeration cylinders. The author stated that the machineability of these castings was generally good and attributed this characteristic to the high carbon content. In the smallest castings (3-lb. gears), the machining is apparently more difficult than in the larger castings, although the small castings go through all the regular machining operations without trouble. The service life of small gears cast in this metal was stated to be four times that of a semi-steel counterpart.

Mr. Roth felt that this iron could be substituted for steel castings and forgings due to "its much greater



MARSHALL POST



O. A. PFAFF



F. J. WALLS

wear resistance and good machineability." The brake drums previously mentioned replaced a steel casting.

## Gears Poured at 2550 Deg. F.

In the discussion that followed Mr. Roth's presentation, it was brought out that the hardness of the gears was quite uniform. Only approximately 5 per cent had to be discarded due to excessive hardness. The gears mentioned were poured at 2550 deg. F. and the brake drums at 2700 deg. F. Lower temperatures resulted in excessive rejects in the form of misruns and brinells over 300. The shrinkage was said to be about the same as ordinary gray iron. Silicon additions were made according to the size of the casting. On small castings up to 40 to 50 points are added in this way, while on large castings only 10 points are needed.

Another phase of high-test iron production — gating — was covered in a paper by M. A. Scott of Greenlee Foundry Co., Chicago, entitled "Production of Uniform Dense Structures in High Test and Alloy Iron Castings."

Essentially this paper dealt with the results of experiments in pouring high strength castings directly through the feeder head or riser. The investigation was inspired by a desire to determine the causes of shrinkage holes at the gates and in the adjoining metal.

In the course of the experiments with this type of gating, it was observed that the temperature of the

sand surrounding the gates and risers worked a noticeable influence on the shrinkage tendencies of the casting. This, it was felt, was due to the effect of the heavy flow of iron heating the sand surrounding these sections and the heat of the sand retarding the rate at which the casting cooled. The conventional gates of a number of different type of castings, in which shrinkage difficulties had been encountered in the past, were changed and the castings were fed through the risers. It was found that this change greatly reduced the number of rejects and leakers.

## Riser Gating Used Extensively

As a consequence of his experiments, Mr. Scott adopted this method of riser gating for the bulk of his company's dry sand work. The gating of green sand molds is also being gradually changed over to this method, but the effect of slower pouring in green sand molds demands further study. Bushings, die wheels, rolls, gear blanks and various pressure castings are at present being successfully poured through the riser.

Another interesting study on cast iron was that conducted by N. A. Ziegler and H. W. Northrup of Crane Co., Chicago. Their paper was concerned with the effect of superheating on the castability and physical properties of cast irons of varying carbon contents.

The base iron used in their investigation carried 2.20 Si, O.55 Mn, 0.114 S, 0.39 P and 3.24 TC. The carbon

was then reduced progressively to 3, 2.50, and 2.25 per cent and these irons were poured into castability patterns of the Saeger and Krynitsky type, under the following conditions: (1) superheated to 3000 deg. F. and cast from 3000 deg. F.; (2) superheated to 3000 deg. F. and cast from 2800 deg.; (3) superheated to 3000 deg.; (4) superheated to 2800 deg.; (4) superheated to 2800 deg. and poured from 2600 deg., and (5) superheated to 2600 deg. and cast from 2600 deg.

## Castability Factors

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The conclusions drawn from these experiments were that castability is increased by increasing carbon content, pouring temperature and temperature of superheat. The carbon content influence, the authors found, presents a straight line relationship. Increasing carbon from 2.25 to 3.25 per cent gave an increase in castability of about 30 to 40 per cent, depending on the pouring temperature. Decreasing carbon, however, gave higher transverse bend, brinell hardness, tensile strength and proportional limit strengths. Higher pouring temperatures also increases these properties, especially in the low carbon ranges.

Fig. 1 is a space diagram presented by the authors to show the effect of carbon content and pouring temperature on castability. It is of particular interest to note that the experimenters found that superheating cast iron to a high temperature and pouring it at a lower temperature, results in a higher castability than pouring from



C. R. CULLING



W. B. COLEMAN

THE new directors of the American Foundrymen's Association elected at the association's annual business meeting in Cincinnati last week are (left to right): Marshall Post, vice-president, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.; Otto A. Pfaff, vicepresident, American Foundry Equipment Co., Mishawaka, Ind.; Fred J. Walls, International Nickel Co., Detroit; Chambers R. Culling, vicepresident, Carondelet Foundry Co., St. Louis, and William B. Coleman, president, W. B. Coleman & Co., Philadelphia.

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the same temperature without superheating. Metallographic examination of the irons tested showed that superheating tends to eliminate free ferrite, refine and localize graphitic flake, and break up dendritic formations, thus substantiating the corresponding improvement of physical properties.

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## Chromium-Nickel Irons

A paper of particular value to a foundryman endeavoring to add a mix to his regular output which will provide a measure of heat and corrosion resistance was that presented by J. D. Corfield of Michigan Steel Casting Co., Detroit. The paper, which dealt with Cr-Ni irons entirely, contained a very comprehensive survey of Ni-Cr irons for such purposes and included much valuable reference data. The author pointed out that excessive precipitation of carbides, which in the case of Cr-Ni alloys are principally chromium carbides, may result in losing up to 50 per cent of the chromium quantitatively present in the alloy. One way suggested to avoid this difficulty is by heating the casting to a temperature sufficiently great to dissolve carbides, followed by a quench to prevent their reprecipitation during the cooling period. When heat treatment is impractical, Mr. Corfield recommended that the carbon content be kept so low that the extent of carbide precipitation will not be serious. Where casting problems prevent doing this, the chromium may be increased so that despite the loss in the neighborhood of the precipitated carbides there will be sufficient chromium to maintain the alloy in a passive condition.

Mr. Corfield conducted several experiments in which various Cr-Ni irons were subjected to a 72-hr. exposure in a 10 per cent boiling acidcopper-sulphate solution and then bent approximately 120 deg. The conclusions he drew from these are that "an alloy of approximately 29 per cent Cr -9 per cent Ni having a carbon content within the range of 0.20 to 0.30 per cent is preferable to the low carbon content of 18 Cr-8 Ni alloys for use under many service conditions and it is preferable from the foundryman's viewpoint since it is somewhat more fluid at normal pouring temperatures by reason of its higher permissible carbon content. This conclusion is not applicable in cases where the addition of Mo is indicated to achieve greater resistance to sulphate corrosion or to other corrosive agents to which Mo is itself particularly inert. It will be found, according to Mr. Corfield, that an increasing number of consumers are now specifying the 29-9 alloy for casting requirements and in many cases these castings are being assembled into structures with rolled sections of 18-8 and related alloys. Producers of rolled products are limited as to the amount of Cr they can add before the problems incident to rolling become insurmountable. Consequently they place their reliance upon a low carbon content and the addition of stabilizing elements such as molybdenum, titanium and columbium to develop the necessary corrosion resisting properties. There is no reason, however, why the foundryman should discount his own natural advantage in this respect.

"The choice of material for castings intended for use at high temperature involves consideration of two major factors, namely, resistance to chemical attack and physical strength. Under oxidizing conditions a minimum of about 15 per cent of Cr is required plus the addition of at least 12 per cent of Ni to impart strength and toughness and also to enhance the oxidation resisting properties of the metal. In a high sulphur atmosphere a minimum of 24 per cent Cr is essential."

## Determining H. in White Iron

A method of determining the hydrogen content in solid white cast iron by direct combustion in oxygen was described in a paper presented by H. A. Schwartz and G. M. Guiler of National Malleable & Steel Casting Co., Cleveland. Numerous past researches into the effect of hydrogen in ferrous metal have indicated that this element exerts a very important influence, yet, according to the authors, there is an apparent lack of knowledge as to the actual amount of hydrogen which white iron may contain.

Not satisfied by the results of determinations made by the vacuum fusion method, experiments were directed toward developing a direct combustion method. The apparatus used included a combustion furnace similar to the type used for carbon determination, a combustion tube 34 in, long and 1 in. inside diameter, and a glass cylinder sulphur trap 2 in. long containing a column of coarsely powdered lead chromate about 11/2 in. long completely filling the tube. The procedure used in making a determination is as follows: Weigh a 2 gram sample and burn. This is the blank. Then burn a 5 gram sample and weigh. The difference between 5 and 2 grams is the water from the hydrogen contained in 3 grams. This weight is then calculated to per cent hydrogen on a 3 gram sample, viz: 18.016 : 2.016 ::

Value of X

= Per cent of hydrogen.

Other data presented in Messrs. Schwartz and Guiler's paper was to the effect that white cast iron may contain up to 0.0015 per cent H<sub>2</sub> but frequently much less and that H<sub>2</sub> escapes to a considerable degree and at a considerable rate at 1470 deg. F. and over, that the H<sub>2</sub> content of white iron is to some extent related to the presence of rust on the scrap, and that ladle addition of metallic alloys. Mn, Cr, Mo and V have been invariably accompanied by quite large reductions of H, content.

## Pressure Plates Discussed

At the malleable round table meeting on Monday, considerable interest was evidenced in the use of pressure cast pattern plates. Several users of this type plate stated that they found that in addition to being generally less expensive than the sand cast plates, they were more accurate. When first using pressure plates, one malleable melter said that he had experienced difficulty in keeping castings to size, as they were constantly running larger. Investigation of the problem indicated, he explained, that a shrink rule



D. J. CAMPBELL



J. R. ALLAN

of ½ in. should be used with the pressure plates, instead of the conventional 5/16 in.

Then turning to the consideration of synthetic sands, it appeared that the majority of those expressing opinions found that the casting finishes resulting from its use compared favorably with natural sands. It was generally agreed that the chief danger to guard against in using synthetic sand was excessive moisture. Too much water raises the hot strength of the sand greatly and causes hot tears. Occasionally, it was pointed out, excessive fines in the sand will also cause hot tears. The amount of fines in the heap was adjudged to be deserving of very close control if the foundry scrap loss was to be kept low.

## Blast Dehumidifying

The question of dehumidifying the blast was also debated at considerable length and it was obvious that there is no agreement among cupola operators as to the value of this procedure. Several plants have given much study to the problem but none had apparently taken any steps toward actual installation of the required equipment. One metallurgist stated that his observations were that when the moisture content of the blast was low, the iron mottled easier, while high moisture gave the castings a tendency to crack. He thought that the proper practice, with moisture control, would be to hold the moisture constantly at about 41/2 grains per cu. in.

## High Conductivity Copper

In a paper read by A. B. Kinzel of Union Carbide & Carbon Research Laboratories. Inc., on "High Conductivity Copper Castings," the industrial alloys available which have high strength combined with high electrical and thermal conductivity were reviewed and much scattered data pertaining to these alloys were correlated. The production of alloys with over 80 per cent conductivity was discussed in considerable detail. Most of the alloys of this class are of the precipitation type, based on chromium, usually present as a silicide or beryllide. Nickel or cobalt similarly present, it was indicated, result in about 45 and 60 per cent conductivity respectively.

In melting these Cr-Si alloys it was recommended that a bath of copper be prepared under a cover of charcoal,

		Per Cent	Carbon	
Heat No.	Writers Lab.	Lab. A	Lab. B	Estimated
1580	0.114	0.115	0.116	0.127
1586	0.176	0.197	0.177	0.187
1589	0.118	0.111	0.126	0.138
1591	0.174	0.182	0.167	0.191
1592	0.141	0.151	0.137	0.161
1605	0.200	0.212	0.194	0.191
1609	0.179	0.189	0.172	0.193
1612	0.184	0.189	0.183	0.191
1625	0.136	0.135	0.120	0.145
1627	0.170	0.169	0.164	0.179

Fig. 2—Results of checks from outside laboratories on the method of determining carbon content in plain carbon steel as described in H. H. Blosjo's paper.



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F. H. CLAUSEN

READING left to right are the three recipients of the achievement medals awarded at the 43rd convention by the Board of Awards: D. J. Campbell, Campbell, Wyant & Cannon Foundry Co.; J. R. Allan, International Harvester Co.; H. S. Falk, Falk Corp., and Fred H. Clausen, Van Brunt Mfg. Co., Horicon, Wis., who delivered this year's Board of Awards address.

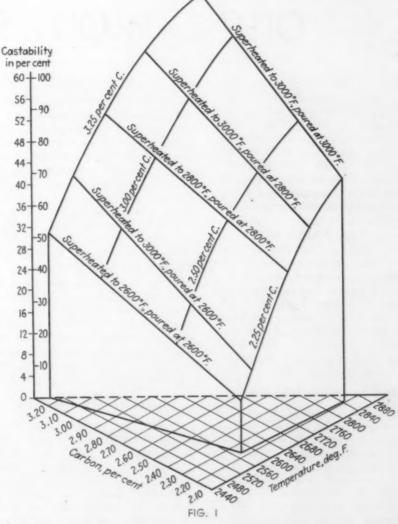
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glass, or salts such as a mixture of sodium and calcium fluoride. In adding Cr it was stated that the most consistent results are achieved by the use of pigs; recovery of 90 per cent of the Cr being usual. The use of graphite skimmers and stirring rods was also advised in order to avoid iron contamination.

The causes of casting defects was the chief topic discussed at the nonferrous round table meeting on Tuesday. One speaker warned against the improper diagnosing of defects very often led to still further difficulties. Among the chief causes of various defects were listed core expansion, hard ramming (misruns), gating a heavy casting to a small casting, and the absence of adequate vents. A maker of airplane parts said that throwing too much sand under the bottom board after striking off and hard clamping were two frequent causes of bad castings that were very hard to discover. The opinion was expressed that the non-ferrous industry had not yet reached the maximum properties of their alloys and that improved practice was necessary to obtain these properties.

## Steel Melting Symposium

The symposium on steel melting practice was another popular feature of the convention. This consisted of papers on steel foundry basic openhearth, acid openhearth, basic electric, acid electric, converter and induction furnace practice. Each paper



THE effect of carbon content and pouring temperature of cast iron on its castability are indicated in this space diagram.

was very comprehensive in coverage and included complete details on construction, charge, draft, etc. The association has taken these six papers and combined them in one volume which can be obtained from the association's Chicago headquarters. Another steel paper of interest was that by H. H. Blosjo of Minneapolis Electric Steel Castings Co., Minneapolis, on "A Rapid Method for Determining Carbon in Plain Carbon Steels, for Control Purposes."

The instrument described by Mr. Blosjo was developed mainly to satisfy the need for a rugged but cheap instrument capable of rapidly determination.

ining the carbon in the melt of small electric furnaces.

The method described consists of comparing the magnetic permeability of a bar of unknown carbon content with permeability of a bar known carbon content. The actual magnetic permeabilities are not measured, but the effect of the differences of potentials created in coils by the collapse of induced magnetic flux is measured with a ballistic galvanometer. The time required to make the determination from the time the test sample is poured until the carbon content is determined is not over  $2\frac{1}{2}$  min. In an effort to check the results of this meth-

od with those reached by outside laboratories, 10 samples were sent out for analysis. The results of this test are listed in Fig. 2.

A statistical study of 78 heats indicated that in 70.5 per cent of these heats the melter knew the carbon content of his heat within an accuracy of plus or minus 0.01 per cent carbon about three minutes before deoxidizing. In 97.4 per cent of the heats the carbon content was known within an accuracy of plus or minus 0.02 per cent in the same time. Only two out of the 78 heats varied more than 0.02 per cent carbon from that indicated by the instrument.

## STEEL WAREHOUSEMEN HEAR HOOK DEFEND PROFIT SYSTEM

HICAGO—Two hundred fifty steel warehouse and mill representatives spent two days of last week at the Drake Hotel in Chicago discussing steel distribution, merchandising, warehouse problems and "what's the matter with business." The occasion was the 30th annual convention of the American Steel Warehouse Association, and the attendance was said to be the highest in years.

Charles Heggie, Scully Steel Products Co., Chicago, was elected president for the coming year, and Walter S. Doxsey was renamed executive secretary. The new vice-presidents are Howard M. Tayler, Tayler & Spotswood Co., San Francisco, and Richmond Lewis, Charles C. Lewis Co., Springfield, Mass. W. H. Kline, Burke Steel Co., Inc., Rochester, N. Y., was elected treasurer.

## Hook On Private Enterprise

The feature address of the meeting was delivered at the banquet Wednesday night by Charles R. Hook, president, American Rolling Mill Co., Middletown, Ohio, and chairman, National Association of Manufacturers, who spoke on "Private Enterprise and Our Standard of Living." Mr. Hook enumerated the accomplishments of the free enterprise system under which we live, and stated that the encourage-

ment of individual initiative is essential to the success of this system.

To save the private enterprise system, which is in danger on many fronts, Mr. Hook advised the elimination of Government competition with private industry, the limitation of Government expense to the necessary administrative bodies and unemployment relief, and the spreading of knowledge among the rank and file of this country so that they may understand the benefits and advantages of this free enterprise philosophy.

Mr. Hook is a firm believer in the education of employees by management, and told how Armco's foreign offices conduct regular surveys of certain iobs in steel plants abroad and compare them with regard to standard of living, purchasing power, etc., with the same or comparable jobs here.

## Urges Wages Be Compared

The Armco president then urged strongly that the public be made aware of a publication of the National Association of Manufacturers entitled "Yardsticks of Industry," which graphically compares the quantity of various essentials that working people can buy with one hour's pay in this country and in several foreign nations. He believes that this type of endeavor

constitutes the best possible defense against any change in our form of government.

As a final warning, Mr. Hook brought to the attention of the steel warehousemen, various pieces of proposed legislation which have received little publicity, but which nevertheless point toward the elimination of private enterprise and the substitution of Federal control.

R. E. Desvernine, president, Crucible Steel Co. of America, New York, presented his ideas of "Obstacles to Industrial Recovery and the Immediate Future" on Tuesday morning's program. Mr. Desvernine also blamed business troubles today on the constant challenge from Washington to free enterprise, and pointed out that much of the legislation fits into a planned pattern for a new economic system.

## No Early Tax Relief Seen

The gradual increase in Federal participation in private business will be arrested, he feels, and encouragement should be felt because of the definite change in public sentiment. Mr. Desvernine expects no tax relief for business this session of congress because in his opinion the president still is trying to alter the economic structure of the nation. He predicted future relief, however, stating that congress is

realizing the increasing tax consciousness on the part of the public.

Business taxation caused losses in many places where profits otherwise would have resulted, Mr. Desvernine declared, and used his own company as an example to demonstrate how far profit is exceeded in some cases by taxes.

Business should be confident of the future, according to Mr. Desvernine, as he believes the course of opinion has changed considerably, and he cites as an example the new laws against picketing and the closed shop in several states.

## Preparedness Urged

Commitments should be increased now, as the Crucible chief still feels 1939 will better 1938. If inventories were built up to normal levels, the backlog probably would inspire a definite upturn. It is possible to "understock as well as overstock," he said.

To take care of this rising demand, whenever it comes, it is imperative for the steel mills and steel warehouses to work togther so that they can take advantage of any improvement and not be caught unprepared. He recommended a progressive attitude be followed in the conduct of the warehouse business. Adequate stocks should be maintained to meet this demand, as when it comes, speed in filling orders will be desired, and the warehouse should be able to provide this service.

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The objectives and the progress of the association's mill relations committee in merchandising hot rolled products was discussed by J. F. Rogers, president, Beals, McCarthy & Rogers, Inc., Buffalo, and chairman of the committee.

## Study Customer's Mind

B. F. Bills, Benjamin F. Bills & Associates, Inc., Chicago, urged the warehouse representatives to require as much of their salesmen as they did of their steels. He pointed out that in testing salesmen, as scientific a program should be followed as when a certain analysis steel is being inspected for a certain application.

In discussing price cutting, Mr. Bills said the only solution, other than industry-wide cooperation, was a study of the customer's mind. Something must be found which will supplant low prices in the minds of buyers so that the sale will still be made. The appeal of the product, and what it can do in particular instances is what should be sold, rather than the product itself.

The salesmen should get on the using side of selling, Mr. Bills said, instead of on the buying side.

A sales talk should contain illustrations of what the product can accomplish just as advertisements use the appeal of the photograph to aid the printed word. Further, the sales talk should be planned in advance and follow a definite pattern, the sequence of which should be as the customer buys.

Norman L. Deuble, metallurgist of Republic Steel Corp., Massillon, Ohio, was scheduled to speak on the metallurgist's approach to warehouse problems but Mr. Deuble spent most of his time discussing mill problems. He pointed out that the mill must consider complaints from warehouses on the gage, surface, squareness, and flatness of sheets. Overgrading has resulted from the competition between the continuous sheet and strip mills and the older equipment, according to Mr. Deuble, and the customer benefits because much special treatment is accordingly proffered without charge. when extras should be added. In the speaker's opinion, the warehouse should be charged for the extra flatness, resquaring, special surfaces, and extraordinary tolerances, now being received in many cases as a direct result of this competition. Mr. Deuble believes the customer would not mind the extra cost, and that it should be passed on accordingly.

## Stainless Distribution

Warehouse difficulty with stainless steel can often be blamed on improper a p plication and fabrication, Mr. Deuble declared, and urged warehouses to consult their source of supply when trouble is encountered. Many times, too, the metallurgical expert said, warehouses ask mills for certain steels and specifications which are very difficult if not impossible to obtain. To remedy this condition, Mr. Deuble suggested more complete cooperation between metallurgical departments and the warehouse buyers.

C. M. Inman, Pratt & Inman, Worcester, Mass., in his talk on "Fundamentals of Cutting Costs," produced facts and figures pertaining to the cost of cutting material by a warehouse. In the first place, he stated, the mill cutting schedule cannot be applied by a warehouse, because of the wide difference between the two. Then, too, he continued, difficulty will be encountered if a system to discover the cost of warehouse cutting is based on hourly time required to cut, because some warehouses are equipped with

high speed positive feed circular saws while others have slower gravity feed hack and band saws.

## **Cutting Cost Control**

Mr. Inman said he was more interested in the total elapsed time of preparation for cutting, the removal of cut pieces and the determination of productive labor time, than in the period required for actual cutting. Cutting costs can never be secured until a study is made combining various opinions as to proper costs and methods of allocating them in a uniform manner. These costs, said Mr. Inman, should be based on a cost per cut plus a per pound cost.

Mr. Inman illustrated the importance of controlled cutting costs by telling how inadequate return for the cutting operation often results in an attempt to cut down waste by stocking very long bars, or, as in the shafting sizes of cold finished steel, bars of 10 ft. to 24 ft. in every multiple of two. In New England, Mr. Inman pointed out, only bars of 16, 20 and 24 ft. are carried as standard stock lengths, and a similar condition exists with widths stocked of plates.

Many lengths and widths are expensive to carry, he reminded his audience, and if a warehouse is faced with this situation, it can blame only itself, and not trade demand, because proper control of cutting and cutting costs would render this unnecessary.

A number of interesting charts and mathematical formulae were used by Mr. Inman to illustrate his theories.

## Directors Reelected

Reelected directors at large of the association to serve for three years were E. C. Ducommun, Ducommun Metals & Supply Co., Los Angeles; Everett D. Graff, Joseph T. Ryerson & Son, Inc., Chicago, and E. L. Parker, Edgar T. Ward's Sons Co., Pittsburgh.

Newly elected members of the executive committee include A. C. Castle, A. M. Castle & Co., Chicago; A. Oram Fulton, Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.; Lester Brion, Peter A. Frasse & Co., Inc., New York; Everett D. Graff; E. L. Parker, A. W. Herron, Jr., Jones & Laughlin Steel Corp., and J. Frederick Rogers.

Summaries of the addresses by A. Oram Fulton, Walter S. Doxsey and Charles Dickerson will be found on page 110 of the May 18 issue of The Iron Age.



HE manufacture and use of cold reduced tin mill products has increased phenomenally since 1929. In that year only 0.2 per cent of the total tin mill products was made by the cold reduced process. By 1934 the percentage had increased to 13.1 per cent of the total, while in 1938 cold reduced tin mill products accounted for 58.5 per cent of the total produced. In the first quarter of 1939, this percentage gained further and actually reached 71 per cent. Although it is not expected that the percentage annual production figures for 1939 involving cold reduced tin mill products will maintain that level, the results are

cold reduced tin plate products have also increased substantially during the past few years. According to a study made by THE IRON AGE which appeared in the issue of Jan. 6, 1939, cold mill capacity for producing tin mill products constituted 55 per cent of the total annual capacity for all tin mill products. This figure, of course, would be higher if certain hot tin mill product capacity, which will probably never be used again, were to be eliminated from the total capacity. Such elimination cannot be arbitrarily done, however, until individual companies have written this capacity off their

One of the most recently constructed cold reduced tin plate mills is located at Carnegie-Illinois Steel Corp.'s Irvin Works near Clairton, Pa. Nominally designed for a production of approximately 100,000 gross tons of tin mill products, it represents the latest advances in layout, operating practice, and production equipment. Straight line production is the rule, material advancing in orderly fashion, yet with provision for diverting finished or semi-finished stock at any point without interfering with production rou-

## Stitched for Pickling

Hot rolled coiled strip up to 38 in. wide comes to the tin mill pickling line from the raw coil storage building at the end of the new 80-in, hot strip mill.

In the case of strip to be cold reduced for tin plate, an overhead crane delivers coils to a downtilter at the south end of the pickling building. This in turn discharges the coil to a short trough conveyor for delivery to a processing uncoiler which prepares the surface for pickling. Strip then goes to an upcut shear and on to the stitcher at a speed of 400 ft. per min.



PROCESSING uncoiler, shear and stitcher at the start of the 38-in. pickling line, Irvin Works.

After passing through a wet looper pit, a set of pinch rolls advances the strip through a series of four acid tanks to the cold rinse tank, hot rinse tank, and dryer. Here another set of pinch rolls moves the strip on through another looper pit to another upcut shear where the stitched portion is cut out.

Tractors take the pickled coils from the discharge conveyor to storage or to the cold mills as required. The 38-in. continuous pickling line is arranged for speeds ranging from 60 to 240 f.p.m. The table accompanying this article indicates important technical data on equipment.

Strip for conversion into tin or black plate may be cold reduced in either a five-stand tandem four-high 20½ and 53 in. by 42 in. mill or a four-high 20½ and 53 in. by 54 in. reversing mill, the five-stand tandem mill carrying the bulk of the load. (See The Iron Age, Dec. 15, 1938, p. 24.)

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Fourteen to 16 gage material, 16 to 38 in. wide, is taken direct from the pickling lines and reduced to tin plate gages in 6000 to 12,000 lb, coils. These

coils are then taken to the electrolytic cleaning line by tractors. Placed in the cone type uncoilers, the strip feeds forward to a seam welder.

## Gage Checked Continuously

The seam is made close to the leading edge of the following strip which is placed above the loading strip, so that any loose flap will not impede progress through roll passes, etc. From the welder the strip moves on through the hot washer, past a set of wringer rolls, and into the electrolytic tank.

Leaving the electrolytic tank, the strip moves on past a scrubbing unit and hot water rinse to a set of rubber covered driven pinch rolls. After looping to eliminate tension, the strip is recoiled.

Advancing next to the tin mill annealing department, the clean strip is properly annealed and then transferred to the temper mill department. Three four-high mills are available for temper passing the strip. After this operation, the cold reduced strip is transferred to the shearing lines by tractor and material passing through

the shear lines is constantly checked as to gage by flying micrometers. These units, through time-delay relays, operate assorting mechanisms on the pilers which automatically throw out off-gage plates. Stock to be tinned is delivered by tractor to the white pickling department.

## Tinning Procedure

The pickling equipment here was designed within the organization and consists of two acid tanks and a cold rinse tank under an overhead monorail system. Special pickling crates, mounted on trolleys running along the overhead rail, are loaded with approximately 2400 lb. of sheared plate. These are advanced as required, spending a definite time at each tank. After sufficient time has elapsed in the tanks, the mechanism raises the trolley rail to connect with the next section, allowing free movement of the trolley from tank to tank. Circulating water in the rinse tank assures thorough cleaning.

As the pickled plates come out of the rinse tank they are transferred to portable water boshes, the water being slightly acidulated to avoid any possibility of oxidation occurring prior to tinning. These units are moved by special tractors to the tin house, being delivered to the tinning machines or bosh storage as desired. At the tinning machines the plates are transferred by hand to the magnetic feeder boshes in front of each unit. These magnetic feeders are a development of the organization and involve a number of unique features which result in the uniform delivery of plate one at a time to the tinning machines.

Five 75-in, tinning machines and nine 64-in, machines located in the tin house are installed in a row down the center of the building, all under one long hood with individual draft compartments over each machine to carry away any fumes and products of combustion.

As the plates come out of the bosh, a roll type feeder takes them down through the flux into the metal side of

## Irvin Cold Reducing Tin Mill Division

## EQUIPMENT

## REMARKS

Tandem Cold Mill

Five-stand four-high, 201/2x53x42 in., rated capacity 100,000 gross tons annually, 600-hp. motor on first stand, 1500-hp. motor other four stands. Strip speeds range from 600 to 1650 f.p.m. Will handle stock 16 to 38 in. wide and in gages 14 to 30. A 20x42 in. collapsible stripper type tension reel is driven by a 300-hp. motor. A belt wrapper is provided to permit rapid operations in feeding on new strip. A 5000-kw. motor-generator set furnishes 600 volt d.c. power to this mill.

Reversing Cold Mill

Four-high, 201/2x53x54 in., 3500-hp. motor, strip speed ranging from 500 to 1100 f.p.m.

Three Electrolytic Cleaning Lines

Handles 16 in. and 38 in. wide strip at speeds ordinarily ranging from 500 to 800 f.p.m.

11 Gas Fired Annealing Units

36 bases designed to handle 16 coils per base when stacked two high. Each stack is covered with a 3/16-in. welded sheet steel hood to permit controlled atmosphere annealing. Heating covers for annealing furnaces are provided with three horizontal banks of U-shaped tubular heating elements, one being centrally located longitudinally between the coil hoods.

Annealed stock is delivered by transfer car to tin temper mill department.

Three Temper Pass Mills

Two are four-high, two-stand, 18x421/2x42 in. and one is four-high single stand, same size. Strip speeds range from 600 to 1500 f.p.m., tempering strip from 16 to 38 gage.

Six Flying Shear Lines

Four have shears of reciprocating type and two have drum type shears. Products are automatically gage assorted.

Strip goes from shear lines to batch type white picklers and from there to tin house where 14 hot dip pots are installed. Five of the tinning machines are 75 in. and the other nine are 64 in. units.

## Production For Sale of Tin Mill Products Black and Coated—Total Industry (Gross Tons)

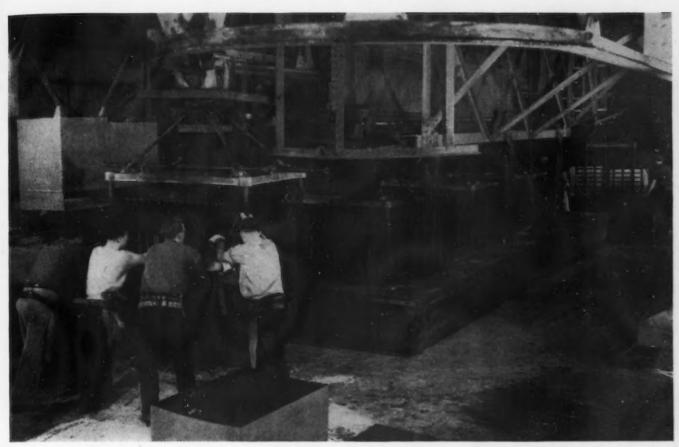
Year	Hot Rolled	Cold Reduced	Total	Cold Reduced
1928	2,130,012		2,130,012	0.0
1929	2,155,773	4,400	2,159,173	0.2
1930	1,866,986	26,000	1,892,986	1.4
1931	1,564,823	47,052	1,611,875	2.9
1932	1,080,427	61,519	1,141,946	5.4
1933	1,816,610	147,248	1,963,858	7.5
1934	1,508,329	227,102	1,735,431	13.1
1935	1,507,849	462,706	1,970,555	23.5
1936	1,931,803	552,472	2,484,275	22.2
1937	1,837,206	1,010,006	2,847,212	35.5
1938	708,933	998,582	1,707,515	58.5
1939 (1st. Qt.	.) 122,195	299,704	421,899	71.0

Note: Years 1936, 1937 and 1938 taken from American Iron and Steel Institute figures, previous years estimated.

the tin pot, delivering them to the tinning machine on the oil side of the pot. The tin pots are made of heavy welded steel plate and are individually heated by natural gas-fired submerged type heating elements. Automatic gas and air proportioning equipment is used and the tinning machines operate under automatic temperature control. To assure a constant supply of clean palm oil at the right temperature, a palm oil recirculating system has been installed. Oil from the machines passes through a settling and cooling system to a central reservoir, where fresh oil is added to make up for the loss at the machines. Palm oil pipe lines are all paralleled by steam lines to assure free flow. Thermostatic controls regulate the supply of fresh oil from the recirculating system to each of the

The catcher delivers the tinned plate to the washer, where any excess oil is removed in softened water or mildly alkaline solution, maintained by an automatic feeding device in the washer section. Overflow from the washer goes to a special drainage system which takes it to a recovery plant where the palm oil is removed to avoid stream pollution. After passing through the washer the clean plate moves on through the branner. Specially designed combination vacuum and pressure hoods above and below the sheets as they leave the machine assure absolute cleanliness of the sheet surface. Their construction and principle of operation, involving vacuum in the entering compartment and pressure in the immediately following compartment of the box, removes the last traces of bran from the plate. Continuing the straight flow, the double or triple row of plate moves on to the piler, which is a specially designed automatic unit capable of stacking the finished material in neat piles without scratching.

Fork type tractors take the packs from the pilers at the ends of the tinning lines and deliver them to the assorting room. Here on four long rows of specially designed steel tables, the tinned plates are subjected to a close inspection and assorted to assure uniform quality, by girls specially trained to detect even the slightest flaw. Special high intensity mercury vapor lighting equipment in this room enables a uniform illumination of not less than 19 ft.-candles to be secured at all times. The assorters work in relays and special welfare and rest rooms for the girls adjoin the assorting room.



SPECIAL pickling crates holding 2400 lb. of sheared plates are used in the white pickling department.

GENERAL view of the tin assorting room, showing the high lighting intensity (19 ft.-candles) at the inspection tables.



THE IRON AGE, May 25, 1939-43

## STEEL Frollows

THE proper development of the steel industry rests on the successful solution of the problems with which it is confronted in the manufacture and subsequent use of its products. These problems are brought about by the needs of the customer to permit him in turn to serve his own customers more economically and with a better product. Therefore, customers' needs and requirements become the problem of the steel mill.

Before proceeding to a discussion of individual problems, it might be well to survey some of the general problems affecting all products.

Requirements for quality have introduced a new and serious problem at the steel mill-the problem of testing. Often the amount of steel which must be used up in testing is itself an appreciable item. But this cost is small compared with the testing work. Thus sections must be cut and ground for etch tests, often a substantial number of large pieces. Pieces must be cut, heat treated and polished for microscopic tests for grain size. Further microscopic tests may be required for cleanliness. Additional machining and heat treating is involved in the case of hardenability tests. When such tests are combined for a single shipment, the mill is confronted with a very great amount of laboratory work, and the resultant necessary delays in shipment are at times serious indeed for the user.

Moreover, the producer's activity cannot end even when the steel has been shipped. The technical problems of steel performance have today become so involved that it is necessary for the producer to maintain a highly trained service organization for contact with the trade. Such a group consists of trained technical men, each of whom usually specializes in some particular field and is an expert in his line. The multiplicity of problems is so great that any mill handling a variety of products now maintains a large staff of such men, who follow the per-

formance of the steel at the plants of the various fabricators, to check steel performance as well as to be of possible assistance to the fabricator.

These activities in regard to the finished product have their counterpart in further technical complexities in the production of the steel itself, which add seriously to the cost of manufacture. For in addition to the technical staffs for field work, there are even larger groups of trained men within the mills, whose sole function is to follow the melting, heating and rolling of steel to assure attainment of the specific desired properties in the thousands of different products,

What, then, are the consumer trends which have brought about these changes in steel production? The most outstanding development in modern industry has been the application of mass production methods. The steel industry itself, through its development of production mills years ago. can indeed claim to have been the forerunner of all industries in the development of mass production methods. Having secured the economies through such methods, this same industry now finds itself in the peculiar position of losing much of those economies, because customers have developed their individual requirements to such an extent that it has become impossible to serve their varied needs in any single broad manufacturing program. It is evident that this situation greatly limits the possibility of mass production in steel manufacture. The steel maker is daily confronted with the problem of making each heat of steel to a definite close limit of tolerance in chemistry, size and other physical properties, different sufficiently from other heats for other purposes to preclude the possibility of obtaining the economies resulting from continuity of equipment operations.

Further, in an age of improvements it is not sufficient to maintain quality and uniformity of product. There is a need for improvement, so that the user may expect not merely a maintenance of product on a good present level, but improvements in behavior which make new developments pos-

sible. The canning industry desires tin plate more proof against corrosion. The oil industry demands steels strong enough to dig deeper and deeper wells. The railroads demand wheels and rails which will withstand faster and faster high speed trains. Oil refineries require steels to withstand the higher temperatures and greater pressures now commonly employed in the processing of crude oils. Power plants drive their boilers at higher and higher temperatures. Such demands continue to call for better and better steels.

## Tin Plate

To state that there has been a vast change in tin plate in the past ten years is to state the situation conservatively indeed. It is difficult to conceive that as little as ten years ago all tin plate was produced by the hot-mill method from bars or from strip breakdowns with many attendant limitations. Today, over half is cold-reduced and the hot-rolled balance is of vastly improved quality. The remarkable rise in the use of cold reduced tin plate from nothing nine or ten years ago to over half of all tin plate today, shows that it must possess some marked advantages. The advantages are, first, in ductility, brought about through the radically different manufacturing proc-The improved grain structure within the sheet, with the resulting better cold-forming properties of coldreduced material, have furthered its application for uses involving difficult fabricating. Even so, the requirements of the users have advanced at least as rapidly as the improvement in quality of the steel, so that even with the advent of cold-reduced material the demands of the industry still impose extraordinary difficulties in manufacture.

A second advantage of cold-reduced tin plate is in the composition of the steel. Hot-rolled sheets, which are rolled in packs, contain moderate amounts of phosphorus to facilitate opening these hot-rolled packs. Such sheets have widely diversified applications, where their use in tin cans is entirely proper, but in the case of certain specific food products the phosphorus content of the steel renders it

<sup>\*</sup>Abstract of paper presented before the general meeting of the American Iron and Steel Institute, May 25, New York.

## in Manufacture and Use

less resistant to peculiar forms of corrosion.

The cold-reducing process (by avoiding the hot-rolling packs) frees the steel maker from the requirement of the phosphorus content, thus reducing the liability to corrosion and thereby expanding the field of application in tin plate.

A third advantage of the coldreduced product resides in the uniformity of gage, because of the greater freedom from thin edges.

The can manufacturer, in order to meet his many fabricating problems, has recently imposed an additional load upon the manufacturer of tin plate in the requirement for various tempers in the product he receives. These tempers range from very soft to a degree of temper that is most difficult to meet in practice and can only be met (1) by changes in composition, which are greatly restricted by the requirements of the tin plate itself, or (2) by excessive temper rolling which is costly.

Another problem which has involved great difficulty is flatness. This, as well as temper, is obtained in the temper mill operation. At times it seems to the steelmaker almost impossible to obtain these two qualities to the required degree in the same operation.

## Sheet and Strip

It is clear that many of the problems described for the manufacture of tin plate apply equally or are even multiplied in the case of sheet and strip. Because of the multiplicity of these latter products, it seems desirable to discuss them under several headings.

First as to strip—whether it be for subsequent conversion either hot or cold, or for commercial deliveries from the hot strip mill. Uniformity of gage is highly important, and the maintenance of accurate gage over long coiled lengths involves extreme precaution as to hot-rolling conditions and finishing temperatures. Finishing and coiling temperatures must moreover be regulated according to the product. Thus for extra deep-drawing hot-rolled materials, high finishing temperatures must be employed. In



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Corp.

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the case of low metalloid steel, very careful control is needed to avoid the critical range in which the material is hot-short and would give bad edges. In the case of high silicon steels, closely controlled low finishing temperatures are necessary to permit subsequent cold rolling.

In addition to temperature control, rolling must be such as to provide a surface free from mechanical defects or rolled-in scale. Scale conditions are sometimes specified rigidly, as products which are not to be painted and which (like barrel hoops) must go through the forming process without the smudge and dirt of separated scale, and go out to the ultimate user with scale adhering tightly. The trend toward the use of coiled stock is bringing these requirements into greater prominence. The increasing demand for coiled shipments arises from the desire to minimize scrap and handling difficulties for the fabricators. But the rejection problem becomes serious, because it is always possible to remove a few deficient sheets whereas in coils the entire coil must be prime. Further, uniformity of annealing in large coils demands special equipment. Another outstanding strip problem is in coils of light gage, which are made to close tolerances and with physical properties affording freedom from "coil breaks." Coated products in coil form are only in their early stages of development but the demand is increasing.

Cold-rolled strip presents additional problems, an outstanding one being good surface. The demands for great-

ly improved surface on cold-rolled strip became accentuated when lacquers were introduced to replace paint and varnish. Formerly surfaces depended for smoothness upon a number of coats of paint or of varnish. Today the surface of the finished article depends for smoothness largely upon the finish of the cold-rolled strip from which it is made, there being usually but a single coat of lacquer.

Similar requirements are encountered for electro plating, particularly in connection with the recent introduction of chromium plating direct on steel (without intervening layers of copper or nickel).

In addition, it is perhaps proper to mention that one of our sister companies has pioneered in a new cold-rolling-mill construction which has made possible the rolling of stainless steels in 24-in. widths as thin as 0.005 in. without excessive buckling or irregularity of the surface. This is a new mill of revolutionary design and can be expected to do its share in meeting some of the new requirements.

Turning now to the sheet problem, one finds that ductility and physical properties have changed immensely in the past two years alone, due probably in large measure to the introduction of cold-reduced material. The applications in automotive fields, furniture, refrigerators, washing machines and railway passenger cars have greatly increased the consumption but continue to add operating difficulties. An interesting illustration of the higher quality is the fact that fenders in the past few years have changed from 16 gage to 20 gage. This has become possible because the uniformity of physical properties permits very deep draws, with a resultant reduction in thickness often exceeding 35 per cent. This large amount of reduction results in considerable workhardening, so that the finished fender has as good rigidity as the older thicker fender which had less coldwork. Indeed, the same comment may be made for many deep-drawing jobs today, since the requirements have certainly increased in this whole field.

These improvements have come about in large part because of the bet-

ter grain structure and interior quality of the steel induced by cold reducing, improvement in the quality of the steel itself through improved melting practices and also through an understanding of surface texture. Surface texture is important both for deepdrawing and for lacquer adherence, and is one of the properties imparted by a proper regulation of the temper rolling operation. Temper rolling is in addition necessary to eliminate stretcher strains. The problem of stretcher strains, involving age-hardening with attendant change of physical properties, is an acute one. The time from the temper rolling in the steel mill to the actual forming by the fabricator is important, since the properties may not change in a week or two but may change markedly in two or three months. This is further greatly accentuated in warm weather, as compared with the much slower change in cold weather.

Surface finish is of importance in all products, and it is customary for the steel maker to furnish sheets in six or eight different standard finishes. As an example, a bright smooth finish is needed for electroplating requirements, in contrast to drawing jobs which require a dull matte surface, as mentioned previously. The matte surface entrains lubricant, prevents galling and permits flow, features which are of course entirely unrelated to a plating requirement. Gage and flatness are continuing problems and extremely important ones.

In galvanized sheets, special problems arise. Coating adherence requirements are severe, for example in culverts, car roofing, formed roof troughs and conductor pipe. The coating must withstand the forming operation, since corrosion resistance must be maintained after forming. Appearance of spangle is important in jobs like furnace and duct work, Paint adherence may in some products be improved by imparting a special surface to the coating.

## Bars and Semi-Finished Steel

Bars and billets constitute one of the most striking instances of the necessity for adapting the product to mass production. Indeed it can be said that the history of mass production can be traced in the history of the requirements in bars and semi-finished steel products. The first step in mass production was to machine certain parts to close tolerances so that the parts would be interchangeable. Standards of tolerances were set up which were almost unbelievable for those early days, and it was necessary to have steel which would machine with perfect uniformity from bar to bar and from heat to heat. Later. steel was demanded which would machine more and more readily. There is no gainsaying that steel has been improved tremendously in machineability, but it would be idle optimism to believe that the problem is solved, for there can be little question that the trade will demand more and more rapidly machineable steels. Almost simultaneously with the demand for machineability, came the demand for close size tolerances on bars so that they could be fed regularly and rapidly into automatic machines. It is true that close size tolerance is obtained also by cold-drawing, but the cold drawers were themselves using mass production methods, and in order that their machines could operate economically, they required bars hot-rolled to close tolerances. These two features, machineability and close tolerance bars, represent the major problems of the cold-drawn trade today, and will assuredly continue so for some time to come

## Close Tolerances Required

The history of mass production, however, has brought in additional fabricating problems. In cold-heading operations, for example, absolute uniformity is required in forming quality, and it is obvious that extremely close size tolerances are vital in such products also as will be discussed subsequently for wire products. Further, surface requirements with respect to scale are sometimes very strict. Thus some users require a product from which scale shall free itself easily, so that the article upon being fabricated presents a scale-free surface which can be readily painted.

These features may be considered to illustrate the problems arising in fabrication, in addition to which mass production soon brought in a whole series of new requirements involving uniformity of quality in order to obtain uniform behavior in service. Since the beginning of such mass production, better quality steels have been demanded - and produced - from the standpoint of freedom from piping. laminations and surface defects. Further, for material which is put into service directly without further heat treatment, mechanical properties in the as-rolled state become important. This in turn requires extremely close control of finishing temperatures and of cooling conditions. Further, as soon as mass production was expanded to include automatic methods of heat treatment, it became necessary to have steel which responded uniformly to heat treatment within each lot and behaved the same for consignment after consignment. It is interesting that in heat treatment also one of the earliest requirements was uniform and improved machineability. Special heattreating cycles were developed which provided maximum ease of machining, and in the automotive and farm implement trades especially it became necessary to furnish steels with close manufacturing control and close chemistry. which would respond to such heattreating cycles and so result in maximum ease of machining, in heat after

The problems in alloy bars are not only as complex as these just described for carbon steel bars, but are even intensified because of the nature of the product. For example surface quality becomes extremely important when alloy bars are furnished for use in coil springs. Such bars require furnishing to extremely close size tolerances, minimum of surface decarburization and extraordinary limitations on surface seams. In the latter regard, the very severe magnaflux test, while it is an ingenious and rapid method for discovering minute defects, has automatically called attention to surface imperfections which would not even have been considered some years

## Structural and Plate Steels

In structural steels, the severe specifications facing the steel maker are analogous to those in other products. Thus chemical composition must be more and more uniform to provide the strength on which the designing engineer bases his calculations, and to permit him to use working loads closer to the yield point of the material, thus saving in the weight of structures. More difficult requirements include straightness, flatness and freedom from camber. Because of the great size and stiffness of some of these structural parts, as illustrated for example in large I-beams, it is necessary that such members be furnished to a fairly strict degree of straightness and ready for incorporation in the finished structure whether it be a building or a bridge, since no straightening can be done in the field during erection. For the same reason, the product must be free of injurious surface defects such as pits, scabs and slivers. Furthermore, the whole problem of soundness has recently been accentuated because of the advent of modern welding. Whenever structural members are joined on their ends by welding, or whenever torch-cutting is resorted

to, any slight degree of lamination or porosity becomes noticeable at once because of irregularity in welding or deflection of the cutting flame.

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Additional problems are met in structural products in the growing field of high tensile steels. Such steels are more difficult to roll, having a tendency to wire-draw and thus not fill out the section, in addition to which their greater resistance to deformation makes difficult their rolling into thin sections. Such steels require better heating as well as the use of special rolls, usually with special shapes coming out of the blooming mills to simplify the work of the finishing mills.

## Surface Finish Important

In plate products important requirements of the present day include freedom from surface imperfections, reduction of crown and overweight, flatness, and elimination of pipe and laminations. Surface imperfections have come in for more and more attentions, with severe applications in some instances calling even for pickling for inspection. Surface imperfections commonly known as "snaky condition, spongy surface, scabs and rolled-in scale," are not permitted to any degree by presentday standards. Interior imperfections, classified as pipe, inclusions and laminations, must be held to a minimum and these problems increase in difficulty with the size of the plate. In making steel, large plates require large ingots, and if these are not melted and poured with the most rigid practice, there may be excessive scabs and perhaps sponginess. This can be understood when it is considered that practices must be varied, not only for different types of steel but also in making the range from very thin to very heavy plate. Among the heavier plates are base plates used for building foundations and the very heavy plates 2 or 3 in. thick used for pressure stills. As an extreme example one may mention some plates used in Boulder Dam, up to 45,000 lb. each in weight, requiring to be made from a 90,000-lb. ingot, taxing to the utmost the capacity of a mill and all its equipment. The care required in such cases is emphasized when it is realized that the loss of even a single plate of this size would involve a large monetary loss. Considering these circumstances, it is evident that steel-making practice even for the same class of product must vary greatly to meet the requirements in that class. But even so it is perhaps surprising to find that over fifty different open-hearth processing practices for manufacturing plate steel are in use at one plant alone.

Users of plate materials have become increasingly insistent on cold-forming properties, in order to eliminate their difficult and costly hot-forming operations. The hot forming was necessary because of a certain degree of longitudinal weakness in the plates. Great improvement in cold-forming quality has been achieved by the modern practice of cross-rolling which, although it is more costly for the steel manufacturer, has brought about decided savings for the industry as a whole.

Among the alloy plates are those containing nickel or a combination of nickel and chromium. Some of these are air hardening, so that they require slow cooling or sometimes even annealing. Moreover, when air-hardening plates are to be flame-cut to size, they must be heated in a furnace to a high enough temperature to avoid hardening of the edge during flame-cutting so that the edge shall subsequently be machinable.

## Railroad Rails

Turning to the railroad field, one encounters several classes of products requiring specialized mill installations equipped to deal with these products alone. One of these products, unique as to the length of its history, is the railroad rail. Some of our first steel mills were established solely to make bessemer, steel and roll it into rails, and yet the rail problem is still a major one in the steel industry.

Chemical composition is becoming more restricted, and is a serious problem as in other commodities, since it is necessary to make steels of a variety of compositions, so that each size of rail shall have a hardness appropriate to its size.

Representative rails from all heats are required to meet the drop test, in a drop testing machine conforming to the standard of the American Railway Engineering Association. This is a test for toughness and soundness, the height of drop being proportioned to the weight of the rail.

As to interior quality, since the discovery some years ago of the presence of transverse fissures and their responsibility in rail breakage, there has been more and more inspection before acceptance. There has been reason to believe that transverse fissures usually have their origin in minute interior defects called shatter cracks, and these shatter cracks have in turn been practically eliminated by

slow cooling of the rails (as contrasted with the more rapid normal cooling on the hot beds). By proper control of the slow cooling it has become possible practically to eliminate shatter cracks, and the knowledge regarding such treatments has made great strides within the past two or three years. The improvement during actual service has been gratifying, for the A. R. E. A. reports so far show practically no transverse fissures developing in service, in rails that were properly slow-cooled. An additional means for minimizing shatter cracks, as well as improving the toughness of the rails, is realized in the process called Brunorizing, involving additional heat treatment, which is finding extensive application. The Brunorizing process provides in addition marked toughness at low temperatures, an advantage in winter on northern railroads.

Another modification in manufacturing procedure has been brought about because of the fact that rails in normal service have their life shortened considerably through "endbatter," a wearing down due to the batter of the wheels rolling over the rail joints. This problem is now being met in two ways. On the one hand, the ends of the rails are being heat treated, so that the resulting increased hardness shall be adequate to resist such batter. On the other hand, a large program of experimental work has been under way on the use of rails welded into very long lengths.

## Railroad Wheels

Problems in railroad wheels comprise in some respects the same types of difficulties as are found in rails,



except that they may even be accentuated here. Thus one encounters the same problem as to internal soundness, and since these become accentuated as train speeds increase and rate of acceleration and deceleration becomes higher, the quality trend in wheels stands out in sharp relief today. Just as in rails, in addition to sound surface quality, internal soundness is of great importance. In addition, there is some liability toward internal fissures analogous to shatter cracks in rails, and the wheel industry has had to accommodate itself to the same remedial measure, namely slow cooling. Indeed this constitutes a present problem of some magnitude, involving as it does possible slow cooling of the wheel blocks from which the wheels are made, as well as the final wheels themselves.

The problem of "close tolerance" arises in wheels for streamliners, as the wheels must approach, to a great degree, a dynamic balanced condition through accurate rolling to size and accurate machining. Further, there are additional problems which are now arising or at least are being greatly accentuated by the much faster speeds. In slowing down a fast train in reasonable time, the braking pressure is very great, so that the surface on the wheel tread is often heated to above its hardening temperature, whereupon when the train stops this thin heated shell is immediately chilled by the cool rail and even by the balance of the wheel itself. This results in a very thin but very hard and brittle case on the wheel, which is liable to initiate a small fracture which progresses in service. It may be stated to be one of the pressing problems of the day to provide a type of wheel which shall be less sensitive to heat action and therefore still more capable of withstanding the service conditions on high speed trains.

Another problem still present is the one called "shelling," which is a type of failure akin to spalling of the tread surface under heavy wheel loads. This type of failure is not considered as hazardous as some others because of its slower progression in service, and because it is not as likely to lead to sudden rupture of the wheel. But it is more prevalent, and therefore is still a problem.

Along with these more difficult technical problems, there is of course the obvious one of resistance to wear. The advent of the heat-treated wheel has lessened this problem in particular cases, and, at the same time, it has lessened the problem of shelling

by providing a higher endurance limit.

## Wire and Wire Products

While the commodities classified as wire products are so diversified as to call for individual treatment in many cases, it is perhaps convenient to consider them together, since they have many problems in common.

In wire nails, for example, as in many other wire products, close size tolerance (in wire form) is becoming more and more rigid. Instead of former tolerances of plus or minus ½ gage size for nail wire, the present tolerance is plus or minus 0.002 in. Added to this are restrictions on head diameter, a feature found also in roofing nails, in addition to which the latter have restrictions on head thickness.

Mention has been made of the existence of cold-heading problems, and their prominence in the wire industry is worth describing. The necessity for close size tolerance is obvious. In addition, the chemical composition has in many cases departed from the former plain-low-carbon steel. Higher carbon and alloy steels have increased in tonnage until they now comprise at least 35 per cent of the total tonnage in this commodity. These latter steels require heat treatment for proper cold upsetting in order to make the steel soft enough for cold-forming operations. Additional requirements came with the necessity for "extrusion" to permit roll threading. In fact, so many products are now being made by cold forming which were formerly cut on screw machines, that the problems of the wire fabricator are of a type not even imagined a few years ago, as, for example, coldheading operations carried out on 1-in. size wire. Decarburization requirements are often included.

## Expansion in the Use of Steel

Every industry should accept as one of its responsibilities the furthering of the use of its products. In solving this problem, the steel industry has been most progressive. It is impossible here to survey the entire list, but a few developments in recent years are described by way of example. Some of the outstanding contributions have either created entirely new uses for steel or have so radically changed the character of an already known product as to make possible its application in fields not previously contemplated.

The revolutionary improvement in sheet steel quality has become a familiar and satisfying story, wherein

the meeting of the demands of the user has proved of advantage to the entire industry. The ability to use this product for automobiles, refrigerators, furniture, radios, washing machines and the like has expanded the market for flat rolled products from about 7,000,000 tons in 1927 to about 13,000,000 tons in 1937. New products are constantly being developed to meet new requirements. An innovation of the past two or three years, namely beer cans, is worthy of special mention. The use of higher tensile steels, having the typical uniformity of gage and temper inherent in cold reduced products, coupled with development of a proper inside coating, has brought wide application in the beer-can industry.

Another contribution, namely lowalloy high strength steel for light weight construction, which has already been mentioned, is deserving of further comment. The economies that can be effected through decreased weight of transportation facilities have long been appreciated and awaited the development of such construction materials.

An important contribution of the past five years has been the steel bearing pile, which has made possible the use of design loads higher than were previously permissible.

Armored bridge flooring, a combination of steel and concrete having twice the load carrying capacity of the older conventional floorings of equal weight, has been developed and is now extensively used in recently constructed bridges. An even more recent advancement of the industry is an open type flooring which can be applied directly to bridge construction with further saving in weight.

In thus reviewing the contributions of the steel industry, it assuredly seems justifiable to predict further expansion in the use of steel products for the future. The directions that these will take no one can say, but one development is already upon us and is much in the public eye—the steel house.

The past eight years have seen several hundred steel houses completed, not to mention an even larger number of gasoline stations, dairy bars, roadside taverns, bus depots, tourist cabins, etc., typical of the present rapidly expanding demand for commercial and industrial adaptations. Located from Florida to Minnesota and from New England to California, these buildings are daily performing the function of shelter in all types of climates to the satisfaction of their owners.



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## GEAR MAKERS REVIEW VARIETY OF TECHNICAL PROBLEMS



A COMPREHENSIVE program of addresses and papers, each of the latter formally discussed by three or more members, featured the 23rd annual convention of the American Gear Manufacturers Association, held May 15-17, at the Hotel Cavalier, Virginia Beach, Va.

Technical topics included gear metallurgy, materials for worm-gear drives, surface hardening of gear teeth, turret lathe methods applied to small-lot gear production, and modern drafting room practice. Also, the application of gear reducers to oil-well pumping service, and the development of a smaller automobile transmission, the latter by an engineer of the Cadillac Motor Car division of General Motors.

A session presided over by R. C. Ball, president, Philadelphia Gear Works, Inc., and chairman of the association's industrial relations committee, featured a number of reports by the commercial and other standing committees. Addresses at this session included one on "Safety" by E. S. Sawtelle, vice-president, Tool Steel Gear & Pinion Co., Cincinnati.

High points of this year's annual dinner, on the evening of May 16, were addresses on "Industrial Mobilization," one by Col. H. B. Jordan, Ordnance Department, U. S. Army, and the other by Hartley W. Barclay, editor, Mill &Factory. Entertainment follow-

ing the dinner included a floor show and dancing.

## C. F. Goedke, President

Election of officers resulted in the naming of Charles F. Goedke, president, Ganschow Gear Co., Chicago, president; U. Seth Eberhardt, vicepresident, Newark Gear Cutting Ma-



CHARLES F. GOEDKE PRESIDENT, A.G.M.A.

chine Co., Newark, N. J., vice-president, and R. S. Marthens, manager, Nuttall works, Westinghouse Electric & Mfg. Co., treasurer. J. C. McQuiston, Wilkinsburg, Pa., is manager-secretary.

D. W. Diefendorf, vice-president, Diefendorf Gear Corp., Syracuse, N. Y., was elected to the executive committee of the association. John H. Flagg, vice-president, Watson-Flagg Machine Co., Paterson, N. J.; F. H. Fowler, chairman, Foote Bros. Gear & Machine Co., Chicago; Charles F. Goedke and R. S. Marthens were reelected to the executive committee.

Two companies were admitted to membership. They are the Eberhardt-Denver Co., Denver, with Fred R. Eberhardt, voting member, and the Lamont Gear & Machine Co., Philadelphia, with David J. Lamont, voting member. Prof. F. A. Berger, Washington University, St. Louis, is a new academic member.

## Upswing in Gear Sales

An upswing in demand for industrial gears was reported. On this, Howard Dingle, president, Cleveland Worm & Gear Co., and president of the association, in his opening address said:

"Our gear manufacturing index seems to indicate that the gear industry is showing a healthy growth. While our business in 1938 was far below that of 1937, the industry as a whole compares favorably with what would have been considered normal 10 years ago. The index further shows that the trend in 1939 is definitely upward."

In view of the fact that the gear industry reaches into every branch of industrial life, the association's index is considered a good barometer of general industrial trends. It is based on statistical records that go back to 1928, which with 1930, is considered a normal year in the gear manufacturing industry.

## Technical Standards Reviewed

Technical standardization continues to have a prominent place in the association's activities. Although no new recommended practices or standards were submitted at this meeting, progress was reflected from the reports of various subcommittees of the general technical standards committee, which is headed by T. R. Rideout, engineer, Westinghouse Nuttall works. Revision of two existing practices were submitted by two of the subcommittees and progress reported by four others.

Two recommended practices, namely, "Backlash for Industrial Spur Gears" and "Keyways for Holes In Gears," have been reviewed for submission to sectional committee B-6 for approval prior to consideration by the A.S.A. Changes in the first item include the title, which is now "Backlash for General Purpose Gearing." The A.G.M.A. recommended practice for non-metallic gearing has been reedited to meet phraseology suggestions of the sectional committee, prior to submission to the A.S.A. for adoption.

## Variety of Technical Topics

TECHNICAL papers presented at the four general sessions of the meeting included one on "Gear Metallurgy," by E. J. Wellauer, research engineer, Falk Corp., Milwaukee. In this the general aspects of modern gear metallurgy, more particularly as applied to gear trains for industrial applications, were discussed. The paper includes a résumé of modern gear materials—their selection, properties and heat treatment—and discussion of the more or less intangible metallurgical factors upon which gear material selections are predicated.

The modern gear metallurgist is a specialist, he said, and should have a background of design, manufacturing and metallurgical experience which will enable accurate evaluation of all the factors which enter into the selec-



U. SETH EBERHARDT VICE-PRESIDENT, A.G.M.A.

tion, specification and processing of gear materials.

In discussing gear materials, he pointed out that steel was the most widely used because it is capable of being processed to a great many different characteristics, each of which has a definite use. As to cast iron, he said that it is difficult to exactly evaluate its position in the gear field because of the very recent developments in the technique of cast iron founding, alloying and heat treating which have not been fully tested under actual service conditions.

Physical properties and forms of gear materials were next outlined. In discussing steel castings, he said that recent developments in the field of centrifugal casting indicated that the process will find application for gear blank manufacture. But the present equipment and technique will have to be developed so as to reduce the cost to a point commensurate with the added benefits, he added.

## Profile Durability Important

Having decided upon the type of material, analysis, method of manufacture and the required physicals, the metallurgist must decide upon the manner in which these physicals are to be secured. In this connection, Mr. Wellauer stated that experience has proven that profile durability must be given more consideration than resistance to breakage. For the average industrial gear train, the heat treat-

ment required to secure a proper durability capacity will provide from three to over six times greater strength capacity than necessary to carry the load.

Fundamentally there are but two methods of obtaining physical (specifically hardness) for increased durability of the contacting surfaces. These are surface hardening, and full hardening, both of which Mr. Wellauer discussed.

Other sections of the paper were devoted to brief consideration of the physical properties of some gear steels, and theoretical considerations which modify or determine material selection for a particular gear application.

In concluding, he pointed out that the status of gear metallurgy is constantly changing. The conditions of lubrication, mounting, manufacturing, accuracy, etc., are continually improving, thereby requiring the gear metallurgists to be ever on the alert for factors which demand modifications in selections or judgment.

## Surface Hardening of Gear Teeth

Surface, or flame, hardening has become an important process in the gear field and experience indicates a more intensive development in the future, said Dwight Van deVate, assistant works manager, Gleason Works, Rochester, N. Y., in a paper on "The Surface Hardening of Gear Teeth."

Application of the process by the Gleason Works started in 1933. After considerable experimenting the present design of machine, which was illustrated and described, was adopted. One important development of the Gleason process was said to be the hardening of both sides of the tooth at the same time. The machine is universal, and can be used for the surface hardening of the teeth of straight bevel, spiral bevel, hypoid, spur, helical and internal gears. Its development has resulted, it was said, in a rapid widening of the field for hardened bevel gears.

The paper included a brief discussion of the metallurgy of surface hardening, and of Gleason practice in the selection and preliminary heat treatment of materials. While many types of steel forgings can be successfully. surface hardened, S.A.E. No's 4640 and 6145 are recommended; these are readily obtainable, comparatively inexpensive, and give uniformly dependable results, said Mr. Van deVate. A lower priced steel, X1340, is also coming into use for certain machine tool gears where the tooth loads do not necessitate the maximum possible surface hardness.



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R. S. MARTHENS TREASURER, A.G.M.A.

As to the advantages of the surface hardening process as compared with case hardening and nitriding, Mr. Van deVate said: "On the larger sizes of gears the considerations of cost and freedom from distortion are definitely in favor of surface hardening. We have hardened gears up to the maximum limits of the machine, namely, 120-in. pitch diameter and 16-in. face width. A large and increasing percentage of all spiral bevel and hypoid gears and pinions cut on the planing, generating machines have the teeth subsequently surface hardened. In this field, surface hardening is a demonstrated success."

In the smaller range of gear sizes the use of surface hardening was said to be growing. On this, he said: "We regularly harden gears of 10 D.P., and have on several occasions surface hardened finer pitches. The quantity and type of gears and the use to which the gears are put must be considered in arriving at practical minimum limits There is a definite field for surface hardened gears in machine tool work, where hardened gears must be made to close limits of concentricity. We make some of our machine tool gears to a 0.0002 in. eccentricity tolerance."

A paper on "Materials for Worm-Gear Drives" was presented at an earlier session by C. H. Bierbaum, vice-president and consulting engineer, Lumen Bearing Co., Buffalo, N. Y.

In a paper on "Turret Lathe Methods Applied to Small Lot Gear Pro-

duction," I. R. Longstreet, Warner & Swasey Co., Cleveland, pointed out that from 25 to 50 per cent of the entire time in the manufacture of gears is spent in the turning of gear blanks.

An outstanding fault in the purchase of equipment is the lack of a balanced program to include with the machine the proper tools for the machine, he said. To save 10 to 15 per cent the purchaser of a new machine tool will often transfer tooling from an old machine, penalizing the production possibilities of the new machine anywhere up to 50 per cent.

The fundamentals of turret lathe practice have not changed, he said, but are often overlooked. They are: (1) Choose the right type of machine for the job, for the product and for the industry; (2) select the best, most universal and most rigid tooling for the product as a whole, commensurate with quantities; (3) combine cuts-make the two main units of the turret lathe, the square and hexagon turrets, cut simultaneously whenever possible; and (4) take multiple cuts from turret stations. The four main elements of time required in the production of any component or workpiece were listed as (1) Machine handling time; (2) work handling time; (3) set-up time; and (4) effective cutting time. Proper correlation of these time elements with the fundamental of tooling results, it was said, in economic production, regardless of lot size.

A recent survey of the turret lathe situation in the gear industry was said to show that basically the choice of machine for the gear industry is a chucking machine, of saddle type, with 20 to 24-in. swing capacity, with fixed type hexagon turret as opposed to cross sliding hexagon turret, and universal cross-slide rather than a compound. A ram-type machine with 20-in, bed capacity is second choice.

A standard method of tooling that permits the wide application of a small group of basic tools was described. This group is known as the permanent set-up, permanent because the main tools are practically never removed from the turret. They are arranged in sequence on the machine. Where the sequence does not fit the particular part, skip indexing or back indexing rather than tool changing is the rule.

## Drafting Room Practice Discussed

Drafting department methods employed at the Falk Corp., the main product of which is geared transmission of unusually broad scope, were described by G. R. Martins, of that company, in a paper on "Modern Drafting Room Practice."



J. C. McQUISTON
MANAGER-SECRETARY, A.G.M.A.

The functioning of the various drafting groups, including inquiry, order analysis, special and heavy drive, marine, commercial gear, and others was briefly outlined. It has been found advantageous to maintain the more technical and theoretical activities in close proximity to the regular drafting personnel. Development and research engineers with their associates have desks in the main drafting room and are thus readily available for consultation.

In discussing standard practices, Mr. Martins said that economy results from use of pencil tracing cloth in place of tracing paper. It not only diminishes wear and tear on the original tracing, but more readily adapts itself to making tracing reproductions. It also reduces tracing costs. In discussing blueprinting and reproduction, it was stated that where additional original tracings are required, reproductions are made by the photolithograph process at a large saving as compared with retracing costs. This process has advantages also on new work where part of the design is a duplicate.

The company maintains a large reference library, with a librarian in charge, for the convenience of draftsmen. This library contains text books, magazines, journals and catalogs. An interesting section of the paper was devoted to apprenticeship training.

Some of the most important factors in the application of gear reducers to oil well pumping service were reviewed by R. G. De La Mater, assistant chief engineer, Parkersburg Rig & Reel Co., Parkersburg, W. Va., in a paper on "The Application of Gear Reducers to Oil Well Pumping Service."

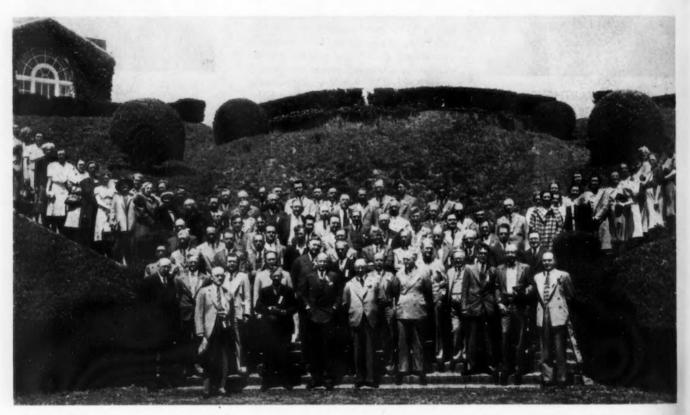
Rapid strides have been made in the development of pumping equipment and in the art of oil well pumping. Ten years ago a 3000 or 4000-ft. well was considered a heavy pumper, 5% and 3/4-in. sucker rods were adequate to handle well loads, which rarely exceeded 17,000 lb. Production at the rate of 500 barrels per 24 hr. from 3000 ft., with a maximum stroke of about 74 in. was considered noteworthy. Today, wells as deep as 8000

Mater. It is also questionable whether there is any other industry where the driven load conditions compare with those of a pump operated by a flexible string of rods at the bottom of a hole 1000 to 8000 ft. deep, and under conditions that can only be assumed and that may change from minute to minute. It is becoming increasingly necessary for designers to have knowledge of the nature of the crank load cycle and the possible variations in this cycle, he said.

In an outstanding paper on "Development of a Smaller Automobile Transmission," G. L. Rothrock, engineer, Cadillac Motor Car division,

tors had to be used and the size of the unit became larger than its predecessor. Also, production problems were new and varied. Satisfactory transmissions were produced, but at the penalty of greatly increased cost.

Working together, engineering and production talent have improved designs and manufacturing technique to an extent that makes the original unit look rather cumbersome. New finishing processes, such as lapping and shaving, together with entirely revised and improved standards of accuracy have allowed the engineer to refine his design. The larger transmission weighed 150 lb., and was used in all



ALTHOUGH the 23rd annual convention of the A.G.M. A., at the Hotel Cavalier, Virginia Beach, Va., featured the usual full formal program, time was allowed between sessions for a variety of recreation.

ft. are being pumped, 7/8 and 1-in. sucker rods are not uncommon, well loads frequently exceed 30,000 lb. and units are built with strokes as long as 132 in. Production at the rate of 1000 barrels from depths of 3000 ft., or 400 barrels from depths of 8000 ft. are not exceptional.

While there are many drives in which the load conditions may be as severe or even more severe, there are few in which the gear reducer is required to operate continuously under as wide a range of climatic conditions, exposure, unfavorable conditions of installation and different, varying or fluctuating load cycles, said Mr. De La

General Motors Corp., pointed out that in the eight years since helical gear transmissions were first made in a large production, marked advances have been made in design and manufacture, resulting in reduced sizes, weights and costs, at the same time maintaining a high standard of quietness and durability.

Introduction of the helical gear transmission brought many new design problems, concerned for the most part with the helix angle. Because little was known about strength and durability or the effect of the additional loads imposed by this type of gear in automobile service, ample safety fac-

Cadillac and LaSalle cars in 1932 and on all Cadillacs until recently. The smaller, weighing 76 lb., is now used throughout the Cadillac-LaSalle line. The origin of the the smaller transmission was a still smaller one, weighing 67 lb. and designed to transmit 170 ft.-lb. in a 4000-lb. car. By a systematic study of all loads and deflections, the capacity of this smaller transmission was increased 67 per cent to 300 ft-lb. torque, while its weight was only increased to 76 lb. It is now used successfully in a 5500-lb. car. Details of the development of the smaller transmission were interestingly outlined by Mr. Rothrock.

## Long Boom Cranes Facilitate Erection Of Preassembled Bridge Members

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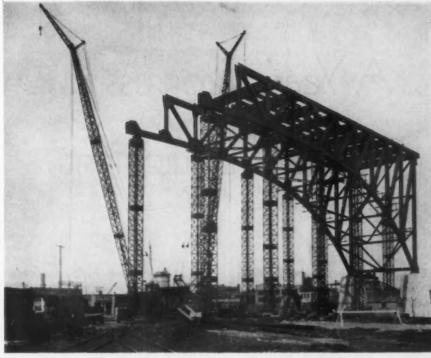
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RECTION of the Main Street bridge over the Cuyahoga River at Cleveland, a 10-span curved structure 2520 ft. long, exclusive of approaches, is being facilitated through use of two Link-Belt crawler cranes equipped with unusually long booms. Each crane has a 130-ft. boom with a 20-ft. jib extension, providing an overall length of 150 ft.

The booms were fabricated in the shops of the R. C. Mahon Co., Detroit firm which has the bridge contract. Approximately 6 tons of Man-Ten steel were used in the construction of each boom. Loads of 25 tons have been handled with the 130-ft. booms at 32 ft. radius, while the jib booms regularly lift 10-ton loads.

All parts of the bridge were pre-



ABOVE

View of span No. 8 of the Main Street bridge at Cleveland, showing the false work and (at left) one of the long crane booms, measuring 150 ft. overall, mounted on a crawler crane.

### BELOW

Cleveland's new Main Street bridge was completely preassembled at the Detroit yard of R. C. Mahon Co., before shipment to the bridge site. Parts were shipped by both train and motor truck, liberal use being made of the latter for shipment of smaller parts.

assembled at the Mahon company's Detroit plant before shipment by truck or train to Cleveland. Erection of the steel was started Nov. 10, 1938, and it is expected that the bridge will be completed in July of this year.

The bridge being curved and superelevated, there has been very little duplication of shapes. In one section in order to attain symmetry of trusses where greater strength is required on one side than the other, due to the curve, the north truss has been fabricated of silicon steel to carry the heaviest load, while the south truss is of plain carbon steel.

The bridge was designed by W. E. Blascr, bridge engineer of Cuyahoga County. It will carry an 82-ft. roadway, 115 ft. above the river. Water clearance is 98 ft. Approximately 10,000 tons of steel are in the super-structure.

## Goodrich Plans Mechanical Goods Factory in South

THE B. F. GOODRICH CO. will erect a \$1,500,00 mechanical rubber goods factory at Clarksville, Tenn., with present plans calling for production to begin in the autumn, according to an announcement by S. B. Robertson, president, and T. G. Graham, vice-president. Located on a 30-acre tract in northeast Clarksville, the new plant will be built of brick, concrete, steel and glass. The modernistic building will be 800 x 200 ft. and will contain 200,000 sq. ft. of floor space.



## A Year's Progress in Foundry Equipment

By FRANK J. OLIVER Associate Editor, The Iron Age

TEMS of strictly foundry applica-tion announced by the makers since the last exhibit of the American Foundrymen's Association in 1938 are reviewed in this article. As was true in the year before, the largest amount of development work has been in connection with sand conditioning apparatus and in combatting the dust and fume problem concomitant with sand handling, particularly at the shake-outs. The tendency is toward smaller units so that the mechanical aids that have heretofore found application only in the larger establishments are now available for the jobbing foundry. Other devices described and illustrated include light weight match plates, cupola accessories, an immersion pyrometer for hot metal, and snagging wheels with reinforced centers.

SIMPLIFIED crawling type sandcutter, is being built by the American Foundry Equipment Co., Mishawaka, Ind., for the foundry requiring a small size sand conditioning unit. Known as model AM, it is made in two standard sizes with cutting cylinders 45 and 50 in. in length. Maximum clearance over the sand is 26 in. One motor is used for operating the cutting cylinder and the electric cable reel; a second motor

is used for the ground travel drive. Elevation of the cutting cylinder is by hand power through a cable hoist. A hand lever is supplied for steering. An equalizer provides complete flexibility to the frame when maneuvering over uneven floors.

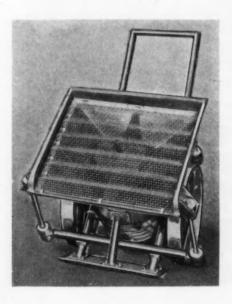
NOTHER type of portable sand conditioning machine is the new and larger Screenarator introduced last year by the Beardsley & Piper

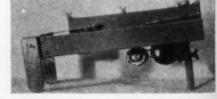
Co., 2541 N. Keeler Avenue, Chicago. By increasing the size of what was primarily a facing sand conditioner, a unit has been developed capable of serving as the sole sand preparing unit in many small foundries. Capacity is from 1000 to 2000 lb. of sand per min., depending upon the screen mesh. In this machine, shake-out sand is shoveled onto the screen by one or two shovelers. Refuse is returned to the floor at the back end and conditioned sand at the front end through an adjustable spout. New sand can also be mixed and blended with the

The screen is given a gyratoryreciprocating motion and the troughlike shape is said to do an excellent cutting and lump breaking job. After falling through the screen, the sand is aerated as it passes through a hopper into the rotor housing. It is reaerated as it is discharged into the



THIS walking type of sand prepar-ing unit is the model AM Sand-cutter, made by American Foundry Equipment Co. for the foundry re-quiring a small size unit. It is made in two sizes measuring 68/2 and 73/2 in. in overall width.





FOR short runs, test work or low tonnage jobs, this single deck cloth batch screen is being offered by the Ajax Flexible Coupling Co., Westfield, N. Y. Cloth area is 12 x 24 in. and the screen is totally enclosed, with both feed and discharge spouts arranged for boots. Drive is from a ½-hp. motor by V-belt to an Ajax-Shaler shaker, size 3B. Shipping weight, 95 lb.

AT LEFT

BEARDSLEY & PIPER'S large Screenar-ator screen, double aerates and piles a ton of sand a minute, or as much as two men can shovel in at high speed. It can serve as the sole sand preparing unit in the small foundry or as an auxiliary unit in a side bay.

pile from the spout of the machine. The rubber paddles and liners of the rotor are readily renewable, and all moving parts are carried on dust sealed anti-friction bearings. Sand prepared by the Screenarator is said to be open, velvety and clean.

## Shake-Out

TIBRATION and self-destruction are said to be eliminated in a new type of shake-out introduced by the Royer Foundry & Machine Co., Kingston, Pa. Alternate sets of bars operating in alternating cycles form a grizzly upon which molds or flasks are placed. Shake-out is accomplished by the periodic impulses of the rising and falling bars. The mechanism operates flat, with a definite conveyor motion, delivering flasks or castings off one end. It can be mounted over a conveyor belt, sand hopper or other receptacle, and can be made to accommodate molds of any size. Power requirements are small and it is claimed the shake-outs will not clog or stall under overload.

## Ventilating Hood for Shake-Outs

NI-FLO hoods for ventilating shake-outs, knock-outs, gyrating screens, ramming machines, sand conditioning equipment, swing frame grinders and other dust and fume creating operations in foundries are being introduced by the Claude B. Schneible Co., 3951 W. Lawrence Avenue, Chicago. The units are designed to operate at various angles and can be installed in a number of positions relative to the equipment being ventilated. A fan draws the dust and fumes away from the operation and this drawing action is spread evenly over a wide surface by means of a relatively small plenum chamber and specially shaped, adjustable louvers. Hoods can be placed in series for long operations or placed on either side of a shake-out, although most equipment can be ventilated adequately with a single Uni-Flo hood. Dirty air is discharged to a Schneible multi-wash dust and fume collector, where plain water is used to reduce the dust to sludge.

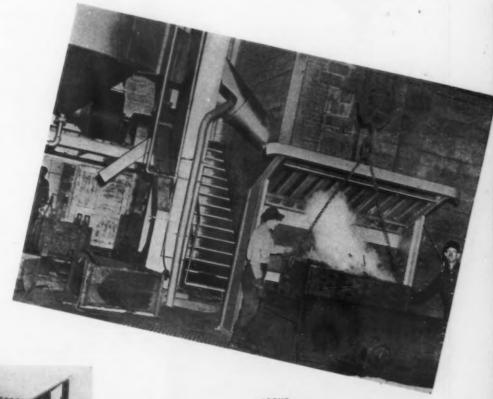
## **Dust Collectors**

S EVERAL other types of wet dust collectors have made their appearance in the past year. In the Hydro-Clone system of dust and fume suppression, sponsored by the Sturtevant Mill Co., Harrison Square, Dorchester, Boston, dust is separated from the air by a combination of centrifugal force and wet impingement and washing. The dust is precipitated in the form of a sludge in the de-watering tank, which is part of the system, and the water is recirculated through the Hydro-Clone, thus economizing on water. Coarse, usable material may be collected separately in a Stur-

tevant Dry-Clone, a modified cyclone type collector, which connects with the wet machine for suppressing the nuisance dust. This combination is desirable for handling dust from foundry shake-outs and sand conditioning plants.

This double system is also used on handling fumes, fly-ash and dust at high temperatures, up to 1800 deg. F. In this instance the Dry-Clone serves as a precooler and a trap for the heavy dust and the air passes to the Hydro-Clone for final cleaning. These dust collectors are made in capacities from 2000 to 30,000 c.f.m., with corresponding inlet diameters from 12 to 44 in.

POG, dust and other particles can be removed from gas or air in a new type of wet scrubber made by the Peabody Engineering Corp., 580 Fifth Avenue, New York. In this triple action unit, gas enters tangentially near the base of the scrubber

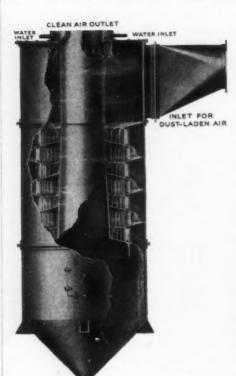


ABOVE

NE of the new Schneible Uni-Flo hoods shown exhausting dust and fumes at a shake-out box. The air is exhausted through a wet washer, seen at left.

## AT LEFT

N the new Royer shake-out, alternate sets of bars operating in alternating cycles form a grizzley upon which molds or flasks are quickly shaken out and conveyed to one end for further handling.



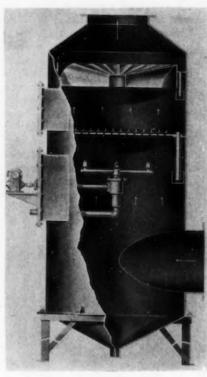
## ABOVE

N the Sturtevant Hydro-Clone system of dust and furme suppression, dust is separated from the air by a combination of centrifugal force and wet impingement and washing. The system can be used in conjunction with a dry cyclone dust collector for removing the heavier particles first and the finer, nuisance dust in the Hydro-Clone.

## AT RIGHT

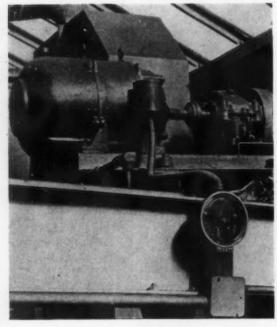
AT RIGHT

A. specification fluidity test pattern for determining the running quality of ferrous and non-ferrous cast metals. The total length of the spiral is 60 in. The drag pattern is shown; the cope side has a number of small buttons placed at 2-in. Intervals on the spiral and the length of the run is expressed in terms of the number of buttons or inches. This aluminum pattern plate is furnished by the Harry W. Dietert Co., Detroit.



## ABOVE

CROSS-SECTIONAL view of the Pea-body triple action scrubber for cleaning gas and air of dust particles, showing the arrangement of the sprays and the perforated plate and grid construction.



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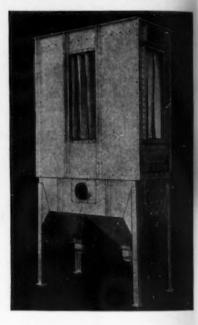
INK-BELT has installed in its Chicago foundry handy sockets for plugging in Westinghouse test instruments for measuring load conditions on its sand handling apparatus. When not in use, the large test jack socket shown is covered with a glass plate. A large flexible cable connects the jack to the multi-instrument analyzer which is usually rested on the floor at some convenient point.

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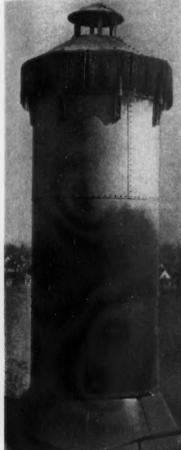
SIZE 65-A assembled Dustube dry dust collector with doors removed to show the sateen weave cloth tubes. These assembled units are a product of the American Foundry Equipment Co.



## BELOW

FFICIAL approval by the U. S.
Bureau of Mines has been given the
abrasive mask shown, made by the Mine
Safety Appliances Co., Pittsburgh. Complete protection is given the wearer
from the heavy concentrations of fine
dust present in shot and sand blasting
operations.



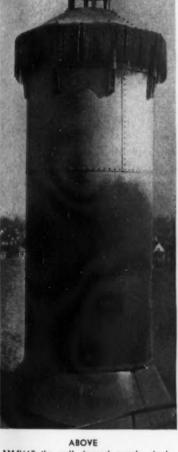


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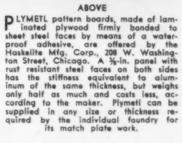


WHAT the well dressed cupola stack will wear. Whiting is now supplying chain curtains attached to the lower edge of the spark arrester cone to stop cinder nuisance in residential neighborhoods.

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ABOVE



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AT RIGHT

AT RIGHT

AND press for making dough, clay or composition rolls used for the sealing of dry or green sand molds. Barrel is 2 x 9 in. and material capacity is 30 cu. in. Machine is loaded by removing the end plug and packing full with material. Standard plugs have 1/2 and 1/2-in. holes. A product of James A. Murphy & Co., Hamilton, Ohio.

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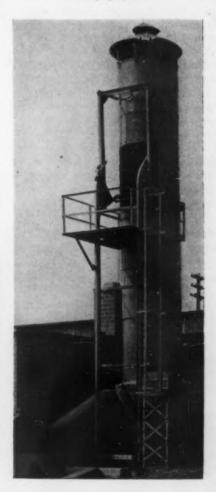
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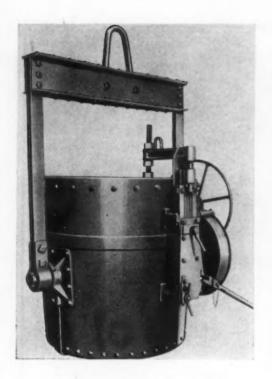
SPECIAL ratary
equipment is being used to mold the
ribs of Fruehauf heavy
duty trailer brake
drums in the Flint,
Mich., plant of the
General Foundry &
Mfg. Co. The ribs are
rolled in green sand,
eliminating the necessity of using cores.
The photograph shows
the cope and drag together with the power
driven slick. Meehanite
cast iron is the material of these drums,
which range in diameter from is to 19½ in.
and weigh from 80 to
115 ib. The ribs or
fins on the outside
give better dissipation
of heat.



BELOW

WHITING skip hoist cupola chargers are now furnished with automatic control equipment so that when the attendant pushes the button the load bucket travels to the charging door, stops long enough to dump the material and returns to the loading position. This automatic feature leaves the operator free to attend to other duties during the charging cycle.





AT LEFT

ATEST in the line of equipment
made by the Whiting Corp.,
Harvey, Ill., is a ladle with improved bottom tap mechanism. This
mechanism is easily adjusted, protected against metal spillage, and
provides liberal travel of the stopper
rod. The gooseneck can be readily
removed when not required.

0 0 0

BELOW

PORTABLE FerroTemp pyrometer for use in determining the temperature of molten gray or white iron by means of an immersion thermocouple A wall type instrument, with flexible thermocouple leads, is also supplied by the Harry W. Dietert Co.

rubber ball type filling, release and check valves is said to simplify operation and assure long life of these parts. Once the abrasive and air valves are adjusted, they need not be touched except for change in air pressure or type of abrasive. Any reasonable pressure over 20 lb. may be used. Abrasive is directed to the mixing chamber through a cone shaped hopper, and the mixture is said to be propelled with maximum force, giving a scouring or peening action on the surface of the work.

## High Strength Core Oils

DURING the past year, E. F. Houghton & Co., 240 W. Somerset Street, Philadelphia, introduced a new series of core oils said to be superior in providing high transverse breaking strength of cores. These oils include Hy-Ten core oils Nos. 4 and 2, non-oxidizing oils that polymer-

and is relieved of coarse particles by cyclonic action. The air then passes up through a zone of water or scrubbing liquid, supplied by slowly rotating sprays under 10 to 15-lb. pressure. Finally the air stream encounters a plate with coarse perforations, the effect of which is to increase the velocity of the dust and water droplets so that they impinge with great impact against square baffles, constantly wet. At this point final scrubbing takes place and the dust laden water leaves through an overflow pipe. The gas or air continues upward to the shell outlet. These units are very compact. A scrubber 4 ft. in diameter and 6 ft. high is claimed to do the same amount of cleaning as a packed tower 8 ft. in diameter and 130 ft. high.

## Assembled Dry Dust Collectors

ULLY assembled units are now Fully assembled units and by the ular type dust collectors made by the American Foundry Equipment Co., Mishawaka, Ind. Intended for use in conjunction with sand blasting, tumbling, shot blasting, grinding and similar applications, these Dustube collectors operate on the same principle as the larger knock-down units. Dust laden air enters through the side of the collector housing into a settling compartment and is directed upward, causing the heavier particles to be thrown from the air stream and to settle. The remaining fine particles are caught on the inside of vertical filter tubes made of a sateen weave cloth. At intervals, the exhaust fan is shut down and the tubes shaken by an eccentric shaft driven by a small electric motor. Pivot and eccentric be a rings are anti-friction types. The housing is fabricated of

types. The housing is fabricated of 14-gage steel sheets in standard sections. Hoppers are a welded assembly, with a mushroom type hopper valve seating against a soft rubber ring. These assembled units are made in four sizes, having a range of 270 to 720 sq. ft. of cloth area, according

to the number of tubes.

## Small Pressure Blast Tanks

P OR cleaning the surfaces of castings, forgings or structural work and tanks from molding sand, scale or rust, the W. W. Sly Mfg. Co., 4700 Train Avenue, Cleveland, is offering a small pressure blast tank, known as type PB, 24 in. in diameter, mounted either on three legs or on a pair of 30-in. wheels. Two sizes are made having capacities of 5 and 7 cu. ft. The abrasive used may be sand, metal shot or grit. The use of



HIGH speed, resincid bonded snagging wheels for foundry and steel mill use are now furnished with steel edged centers by the Abrasive Co., Tacony & Fraley Streets, Philadelphia. As can be seen in the cross-sectional view, these Red Streak flanges consist of a circular steel flange with face flush with the side of the grinding wheel, one edge lining a portion of the center hole and the second edge projecting into the wheel in mounting and give the center hole a better fit on the arbor. Wheels with this feature come in 6 and 12 in. center hole sizes, They can be operated at a surface speed up to 9500 f.p.m.

ize under heat and contain no linseed. They give a high green bond strength and will not gum or stick to core boxes. Plant facilities have been extended to manufacture these core oils in volume, so that uniformity is assured.

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### Immersion Pyrometer for Molten Iron

A PYROMETER for accurately measuring the temperature of molten gray or white iron in the ladle by means of an immersion thermocouple has recently been announced by the Harry W. Dietert Co., 9330 Roselawn Avenue, Detroit. This FerroTemp instrument comes either with a portable meter, weighing 8 lb. complete, or with a wall type instrument which can be read at a distance of 50 ft. The thermocouple itself is 1½ in. in diameter and 19 in. long.

It comes to maximum temperature 15 sec. after immersion in the molten metal. Life is about 100 immersions.

In the portable model, the meter has a temperature scale 6 in. in length, reading from 1600 to 3200 deg. F. Smallest division is 20 deg., allowing estimates to be made to 10 deg. The wall type has a flexible cable extension to the thermocouple proper.

### Casting Sealing Resin

AFTER a few years' use by several foundries, General Plastics, Inc., Walck Road, N. Tonawanda, N. Y., announces its 278 impregnating resin to be commercially available. This solution of specially formulated resin is for increasing the density of certain types of castings. Often an alloy may be specified for reasons of

chemical resistance which may not be the most desirable type for casting a solid, non-porous structure. Occasionally, too, the design of the casting may cause difficulty in feeding in the correct way to overcome shrinkage. Slight porosity of castings which results from these causes is successfully overcome and the casting made tight by the use of this 278 resin solution.

Proper impregnation is made by pressure or vacuum and pressure. After impregnation the casting is baked at 250 deg. F. or higher to set the resin. When hardened in this way the resin is practically unaffected by water, solvents, mild alkalies and acids. This treatment has been of particular advantage where expensive castings have developed porosity after machining, justifying this added expense.

# Thermoloy Process in England Makes Steel

ONDON (By Mail)—A new method of steel production equally suitable for the manufacture of ingots and castings is said to have been successfully developed by a London concern, Thermoloys, Ltd. The process is based on the old Goldschmidt reaction in which a mixture of aluminum and an oxide of iron such as mill scale is used. This, when ignited, produces iron and alumina, the reaction taking place at a very high temperature.

In the new process the aluminum may be replaced by a special reducing agent, which is used in the form of fairly coarse powder mixed with suitable iron ore or mill scale, to which is added suitable steel scrap. The whole is contained in a crucible, the reaction being started by a small ignition charge.

The reaction is rapid and intense; the iron ore is reduced by the reagent, the slag formed rises to the top of the metal and the heat developed melts the scrap. Incidentally, the scrap serves to cool down the entire reaction and renders it capable of being controlled. In the absence of scrap, a temperature of around 6900 deg. F. may be reached, but the presence of the scrap reduces the temperature to about 5070 and 3990 deg. F., according to the quantity and the type of

the steel scrap employed. The mixture of reagent with oxide of iron also contains calculated quantities of certain powders, amounting to from 2 to 5 per cent of the total weight, which control or, in other words, insure the presence of the desired percentages of silicon and carbon in the finished steel. Another addition made to the mixture controls the temperature of freezing of the slag. The reagent is graded in accordance with the fineness of the ore or mill scale

When the manganese in the finished casting is required to be in the region of 0.5 per cent, the requisite quantity of manganese metal or ferromanganese is added to the charge in the crucible. When a percentage greater than 0.5 per cent is required in the final product, the manganese or ferromanganese is added to the melt in the ladle after tapping. Any sulphur or phosphorus present in the raw materials employed are separated out during the process, some passing into the slag as manganese sulphide and as phosphides of iron, the remainder being volatilized during the higher temperature reaction.

The steels so far melted by the process include ordinary mild steels containing from 0.1 to 0.2 per cent

carbon, higher carbon steels, and nickel, chromium and tungsten steels of various types, while satisfactory castings of the 18 and 8 austenitic stainless steel type are claimed to have been produced. In all cases the nickel, chromium, or other special element is added to the crucible, usually in the form of ferroalloy, before the reaction is initiated. One of the most important advantages claimed for the process is the accuracy with which any predetermined composition of steel can be obtained as the result of the reaction.

The success of the Thermoloy process is said to depend on three main factors. In the first place, the size of the materials charged must be accurately controlled. Secondly, the composition of the reaction product is of great importance, but the technique of ascertaining what to put into the addition powders so as to control the composition of the finished steel, within narrow limits, calls for perhaps the greatest degree of skill in the conduct of the process. No data regarding this technique have yet been made public. Finally, the fact that the reaction products are incapable of being ignited in the ordinary way, at a temperature below about 2190 deg. F. constitutes a unique advantage from the safety standpoint.

# THIS WEEK

### ON THE

By W. F. SHERMAN

Detroit Editor

# ASSEMBLY LINE

... Auto production over 80,000 mark as five-day week is resumed temporarily ... Many plants to close for entire holiday week just ahead ... Estimates vary on steel tonnages placed for 1940 models.

ETROIT - In a contrariwise movement, automobile output advanced during the past week and schedules calling for heavier production during the current week were revealed. Increased output is attributable in part to a stiffening in sales, but more directly the approach of Memorial Day is responsible. It is understood that some plants getting in a full four or five days operations in each of the two weeks preceding the holiday will be closed for the entire holiday week. This eliminates the costly alternative of closing for Friday, Saturday and Sunday, as has been customary most of this year with the four-day week in effect, reopening Monday, closing Tuesday, then starting the work-week afresh on Wednesday-a costly procedure in any plant.

Total output of cars and trucks in the past week rose to 80,145, compared with 72,375 the previous week and 49,-310 in the corresponding week of 1938, according to Ward's Automotive Reports. Chevrolet's return to fourday schedules increased its output from 15,000 to 19,000 and was the major factor in boosting General Motors production for the week to 31,885 units from 27,137 in the previous week. Ford, returning to five days a week, boosted the Ford-Mercury output from 16,500 to 20,250, suffering decreases from 400 to 380 in the Lincoln-Zephyr plant. Plymouth output was decreased slightly, from 8570 to 8460, while Chrysler volume registered a slight gain, from 17,690 to 17,900.

The first week of June will see the

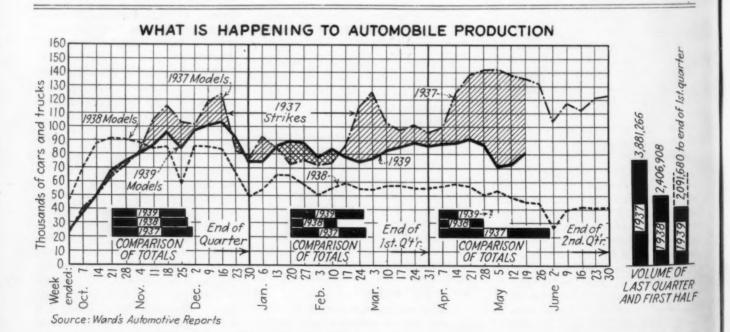
industry at a hesitation point, sizing up May car sales quite critically. It is already known that the first 20 days of May were better than expected, some car buying undoubtedly having been delayed by the late Spring.

### Factory Employment Slips

Meanwhile, factory employment, while exceeding the level of a year ago by a substantial margin, continues to slip, according to the semi-monthly index of the Board of Commerce. On May 15 the index was 89.8 as compared with 96.0 at the end of April and 65.1 on May 15, 1938. Approximately 324,000 factory workers were employed in Wayne County (Detroit), about 22,000 below the April 30 level and 90,000 above the level of a year ago.

### Steel Buying Heavy

Estimates vary as to the amount of steel that was bought by automobile companies at the low prices which have prevailed in the past two weeks. Some companies state definitely that they bought more steel than they did



HUMAN FINGERS
MECHANICAL HANDS



It takes a happy combination of both to fabricate

Barnes-made

Barnes-made Springs

> Skilled hands are matched by machines equally facile in their adaptability to the amazing twists and turns in spring manufacture. Just what this means to you as a user of springs may best be expressed in terms of:

> > QUALITY
> > PRICE
> > DELIVERY



All three considered, you'll find that Barnes-made Springs are the economical buy.

# SOUNDS COMPRESSION SO TORSIO

THE WALLACE BARNES CO.

BRISTOL . CONNECTICUT



SPRINGMAKERS FOR MORE THAN THREE QUARTERS OF A CENTURY

at the low prices of last fall. Others insist that bargain prices were restricted as to the number of customers and the tonnage which they were permitted to buy.

Some commentators have asserted that the steel price reductions will cut automobile manufacturing costs on 1940 models, the assumption being also that this may lead to lower retail prices for cars. This brings to mind the statement of a top executive of one of the large automobile companies back in 1937 to the effect that not a pound of high-priced steel had gone into model production that year. He made the statement quite inclusive, asserting that he meant not only iron and steel but other materials as well. In fact, he said that even though coal prices had gone up in 1937, his company had not been forced to use any high-priced coal. In other words, before Jan. 1, 1937, most good buyers had protected themselves for the remainer of the model year. The next model year, 1938, was marked by no particular upheaval and by no outstanding cases to show that automotive buyers were particularly favored. However, steel for 1939 models was bought last fall at low prices and now

the same thing has happened with respect to steel for 1940 models.

During the past two or three years there have been no outstanding cases of price reductions on automobiles. There have been, it is true, fluctuations of about \$50 on some of the moderate priced cars, and more value has been put into cars, but there has been no general downward trend in prices. During the same period there have been other factors that have added to automobile companies' costs, such as UAW strikes, contracts calling for wage increases, pressure from automobile dealers for larger profits and fluctuations in prices of commodities other than steel.

These varying factors make it difficult to trace even part of retail price fluctuations to a single factor like steel prices. While no buyer in the Detroit area has hesitated in taking full advantage of low steel prices, many of them, on the other hand, furnish excellent arguments against price cutting when discussing their own business. The automobile industry well realizes the importance of general prosperity as a basis for good automobile sales. When steel operating rates and profits are adversely af-

fected, there is bound to be an effect also on automobile sales.

#### Door Hinges of Swedish Iron Not a Success

Experimental attempts to produce Chrysler door hinges from imported powdered iron (Swedish iron) have met with desultory success. The real reason for trying the process was to avoid the high cost of the many die sets required to stamp or forge heavy, complicated hinges, particularly those of the concealed type which are being designed so that only a single large hinge will support the entire door. Of course, the reason for this design is that bodies with a lot of "tumble-in" will not easily accommodate hinges. These parts must stick out several inches at the top and a single hinge in the center of the door, with a possible light hinge at the bottom, would carry the entire load.

Mention on May 11 in this column that Graham-Paige has inaugurated use of Thermoil Granodine on lower ends of connecting rods elicits inquiries about this process controlled by American Chemical Paint Co., Ambler, Pa. The Thermoil Granodine solution is used as a spray or dip, generally the dip, and is one of a rapidly spreading group of phosphate type of treatment. Iron and manganese phosphates form a surface laver in this case which is intended to protect against scuffing. The process is applicable to iron as well as steel. In many automotive applications it replaces copper plating.

### Reich Reduces Types Of Motor Vehicles

ASHINGTON — Standardization and simplification of Germany's motor-vehicle production are provided for in an executive decree issued recently, according to reports to the Department of Commerce. Under the new official regulations the 52 types of passenger cars formerly manufactured are to be reduced to 30 and the 113 types of trucks to 19. Types of motorcycles will also be substantially curtailed, the report said. Most German automobile factories are mechanically equipped only for the production of small series of motor vehicles. The German machine tool industry has not developed automatic machines that can be handled by semiskilled labor to the same extent as has the American tool industry. Mass production methods are used by only three firms in Germany which account for 80 per cent of all cars manufactured in the country.

#### THE BULL OF THE WOODS

BY J. R. WILLIAMS





Ohio Ferro-Alloys Corporation Canton, Ohio

# THIS WEEK IN WASHINGTON

... Stettinius tells TNEC of U. S. Steel Corp.'s financial policies ... Justice Department investigates building costs ... New spend-lend drive by Administration forecast at Washington ... Probe of UMW sought in Hoffman bill.

By L. W. MOFFETT
Washington Editor, The Iron Age

ASHINGTON — The financing policy of the United States Steel Corp. and how it spent more than \$500,000,000 in the past 10 years in expanding plant facilities and developing new steels to meet consumer demand were described last week by Edward R. Stettinius, Jr., board chairman of the corporation, to the Temporary National Economic Committee, which is currently attempting to draw "an objective story of what impedes the flow of investment capital into private enterprise."

Mr. Stettinius, who will be called again before the committee when it undertakes a subsequent study of industry price policy, told committee members that the "rapid strides in the science of steel making have had, and will continue to have, a profound effect upon the national economy." Under questioning he pointed out that the corporation has not determined at what point in any sharp acceleration of demand further expansion of capacity will be contemplated, adding that never in recent years has his organization, spent as much of its internal savings as it did in 1935, 1936, and 1937. He affirmed a statement that it costs from five to 10 per cent more to replace capacity today than it did 15 years ago and told the committee that the corporation lost \$72,175,705 in 1932.

### Discuss Basic Processes

After advising Chairman O'Mahoney that he was not a technical steel man, the witness touched brifly on improved basic processes in the industry, the development of structural and stainless steels, alloys, rail improvements, uses in aircraft construction, high speed trains, automobiles, food packing improvements, oil production, and low cost housing.

For more than an hour, Mr. Stettinius answered questions, most of which were directed by Chairman O'Mahoney and Leon Henderson, former TNEC executive secretary and newly appointed member of the Securities and Exchange Commission. He read from a prepared statement and frequently referred to supplemental financial data requested by TNEC members.

Committee members followed the testimony closely when Mr. Stettinius described briefly some of the improved basic processes in making steel. At one point he interrupted his testimony to invite Congressional and departmental members to view the corporation's motion picture on the manufacture of steel.

"United States Steel Corp., through its subsidiaries, has played a large part in the development and production of alloy steels," Mr. Stettinius related. "It recently has brought out a series of high strength low alloy steels, chief among which is Cor-Ten. The alloying elements used in it, chromium, copper, silicon and phosphorus, impart a most advantageous combination of high strength and resistance to atmospheric corrosion.

"It was developed particularly for the production of mobile equipment, such as the rolling stock of railroads, street cars, buses and the like, where a reduction in dead weight produces significant economies in operation. In the case of Cor-Ten, resistance to atmospheric corrosion is four to six times that of carbon steel, and the tensile strength is approximately double. On railroads the lightened weight of the steel cars means a larger pay-load. It has been estimated that there is a saving to the railroads of \$18 per year per ton of weight reduction, made possible by the use of this alloy steel."

Mr. Stettinius appeared before the committee on Wednesday after testimony had been given by various Government experts and economists at sessions described by Chairman Joseph C. O'Mahoney as "the most interesting and significant presentation yet made by the committee." Opening the hearings on Tuesday, the Senator read into the record a letter from President Roosevelt, who said the question of ascertaining "why a large part of our vast reservoir of money and savings have remained idle in stagnant pools," is an urgent

Unlike Owen D. Young, board chairman of the General Electric Co., who expressed opposition to the undistributed profits and capital gains taxes as "deterrents to equity and adventure capital," Mr. Stettinius confined his remarks to the corporation's financing policies and to answers requested by committee members. The two large corporations were selected, to show that some large companies have been able, through capital accumulations, "to finance themselves internally for some time."

### Spent Less in Poor Years

Mr. Henderson, who was head of the NRA's Research and Planning Division when Mr. Stettinius was liaison officer of the NRA Industrial Advisory Board, sought information on the percentage of capacity operations during the past 20 years, what the corporation's policy has been during the past nine years with respect to replacements, and whether the \$500,000,000 spent since 1929 took place at an average rate of \$50,000,000 a year.

"During the dark years of 1932, 1933 and 1934, naturally no one could foretell the extent of the business depression," Mr. Stettinius explained. "The Steel Corporation was then oper-

Stop tools from turning soft...chipping...and burning-flood them with SUNOCO. Long service records prove SUNOCO prolongs tool life...reduces "down time" for resharpening... and steps up production per machine tool unit. If you're interested in downing "down time" call in a SUN Engineer-let him show you why it's a long time between tool grinds with SUNOCO. SUN OIL COMPANY · Philadelphia PETROLEUM PRODUCTS FOR ALL INDUSTRIES

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ating at a great loss. Since it was necessary that there be adequate working funds to carry through this period, expenditures for plant and equipment were smaller in these years than in the years just prior to and following that period.

"Nevertheless the program to provide modern manufacturing facilities capable of supplying the new demands for steel products was carried on," the witness asserted, citing as examples the construction of a cold re-

duction mill at Gary, Ind., and a new continuous strip mill at McDonald, Ohio.

Mr. Henderson interpreted this information to mean that during the past 20 years the corporation had very little occasion to go into the market for tapping the reservoir there. Replying to further questions, Mr. Stettinius said that generally speaking there is "more outside financing within the steel industry than we typify."

Protesting that one would have to

be a prophet to forecast when the corporation will again launch a modernization program, Mr. Stettinius turned aside another Henderson question which later was rephrased to take into account a comparable change in consumer demand which prompted the last expansion program.

"The prospects that you will be in the market for any large sums for an expansion of facilities in 'the foreseeable near future just isn't there,' " the new SEC member said. Mr. Stettinius agreed that was the case.

Mr. Henderson also sought information comparing the mill efficiency of the steel industry in this country with European mills. Mr. Stettinius replied that he didn't think there was any question about domestic mills being as efficient as any in the world today "after this expansion program is carried out to which we have referred."

Information solicited by Chairman O'Mahoney showed that the corporation has 219,727 stockholders, 210,000 employees and an annual payroll of \$282,209,000. Asked by the Senator what the effect of modernization had been on the number of employees, Mr. Stettinius turned to Ralph H. Watson, vice-president in charge of operations.

### Tells of \$50,000,000 Loan

"For these plants which are affected, which is a small part of the corporation, it amounts to about a 25 per cent reduction—only those plants that are affected," Mr. Watson said. "For instance, in the sheet and tin mills, it is between the slab and the black plate and tin plate and the finished sheet in sheets, compared to the old mills."

Referring to the \$50,000,000 loan advanced to the corporation by banks in New York, Chicago and Pittsburgh in 1938, Chairman O'Mahoney, who sought information on the interest rates, was told they ranged from 1.5 per cent for the first maturity to 3.5 per cent for the third.

"So the current rate for the character of loans made by the United States Steel was substantially lower than that which is available to the ordinary small business for loans it may get at a bank," the Senator observed. "You are borrowing at about the same rate as the Government borrows." Spectators laughed. Mr. Stettinius nodded assent.

Questioned about attempts to stabilize employment, which he said was under study, Mr. Stettinius continued:

"Of course, Mr. Chairman, you



# for Unusual Stampings

Simple or complicated, straight from the press or built up by additional operations, whatever your needs . . . Parish can be of service. Parish men know metal habits, and how to bend these tough materials to their will—and yours.

We ask an opportunity to discuss your requirements with you. A representative will call at any time you suggest.

# PARISH PRESSED STEEL CO.

PACIFIC COAST REPRESENTATIVE, F. Somers Peterson Co., 57 California St., San Francisco, Cal.

must appreciate that it is the consuming industries that really first must get their production schedules straightened out. The automobile industry, the tin plate industry and the structural industry must call upon our supply of steel in even quantity if we are to be able ever to level out our employment curves satisfactorily."

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Isador Lubin, Commissioner of Labor Statistics and Labor Department representative on the TNEC, asked the witness about the relationship existing between the number of emplovees and the rate of operation, pointing out that in 1937 "you were operating at 71 per cent capacity while now you are down in the 40's and you have only cut your labor force by 50,000." The Steel Corporation official explained that figures on that subject are being compiled for the Federal Trade Commission and the Department of Justice but that the whole picture has not been completed.

"The 19-year history of your company is pretty ample evidence of the fact that in at least an organization such as yours, the net savings set aside from depreciation and depletion and profits (when there are any) are almost sufficient to keep an organization modernized and up to date," Mr. Lubin observed.

### Social Viewpoint Praised

Richard C. Patterson, Commerce Department representative who has just resigned as Assistant Secretary of Commerce, expressed interest in the corporation's work development activities on low-cost housing. Characterizing the corporation's financing policies as "sound," Mr. Patterson said:

"You have not pointed out the broad social viewpoint in its public and labor relation that has challenged your company. Both showed that private interest and public interest can, as they should, work together."

Concluding his part of the inquiry, Mr. Henderson expressed the view that the prospects for "individual savings being 'canalized' into your operations is very low." That, to the former WPA economist, is "the importance of this testimony for the savings and investment presentation."

"We hope," Mr. Henderson said before the Steel Corporation spokesman left the stand, "to go into this further at a subsequent time together with price policy and capacity and things like that with this witness and I think that the Committee will benefit tremendously with the same kind of generous frank testimony that the witness has offered here today."

### CIO Fights to Link AFL With Manufacturers

WASHINGTON — Apparently concerned over anti-Wagner Act sentiment reflected at Congressional hearings on the Walsh amendments to the National Labor Relations Act, the CIO early this week intensified its efforts to link AFL President William Green with the National Association of Manufacturers and claimed "detailed evidence" in its possession showing that AFL members are revolting

against the proposed amendments indorsed by Green.

In a pamphlet entitled, "Whose Amendments?" which was widely distributed by CIO publicity lieutenants. Lee Pressman, general counsel, said that "the membership of the AFL does not want to see the Wagner Act amended, and that it is in sharp opposition to the stand for amendments taken by Green and his associates in collusion with the NAM and other reactionary corporation interests."



# Department of Justice Opens Building Cost Investigation

WASHINGTON — Proceeding on the theory that building costs are too high and that "price fixing restraints" on building materials constitute an insurmountable burden and act as "a brake on the general recovery of business," the Department of Justice has sent investigators

into the field and expects to follow through with prosecutions in Pennsylvania, New Jersey, Michigan and Ohio.

Attorney General Murphy, who has been in the limelight since he took the Justice Department post, even overshadowing Thurman Arnold, anti-trust

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division head, made the announcement last week during a press conference at which he said the department's policy would be to prosecute in a single proceeding all groups whose production or distributing practices of a particular commodity, like housing materals, constitute unlawful practices in violation of the anti-trust laws.

Recognizing that the cost of building materials is not the only factor, the Justice Department head indicated that investigation of building trade unions also was a definite part of the move.

There is undoubtedly a sentiment among some high ranking officials in the department that trade unions as well as building suppliers and contractors should be investigated. At the same time there is decided skepticism that it actually will undertake a sincere, thoroughgoing inquiry of the kind. Not before it has been done will general credence be given to the idea that the New Deal will make any move against organized labor, either the AFL or CIO. The Administration is deeply indebted to both groups for political support and to the CIO for financial support also and clearly reflects its obligation and hope for continued backing in its biased execution of the law in favor of labor, particularly the CIO.

Mr. Murphy added:

"With housing costs so high that private industry is unable to provide homes within reach of nearly half of our population, price-raising restraints of trade in this industry are not only an insurmountable burden on the public but act as a brake on the general recovery of business, in which housing must be an important part."

In a restatement on anti-trust policy, described as an attempt to make the Government's program "better understood," the attorney general took cognizance of frequent suggestions that some machinery be established either within or outside the department to advise business firms what they can do without incurring the risk of criminal prosecution.

### No Advisory Opinions

Mr. Murphy turned aside such suggestions, insisting that his department has no authority to render advisory opinions, but pointed out that he will try to make known the department's views and be helpful to business men who seek by voluntary action to eliminate business practices which are "economically harmful to industry, to competitors and to the general public."

In this connection, he emphasized that the Justice Department has no



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authority to grant immunity from antitrust laws and at the same time boosted the President's proposal to establish a Bureau of Industrial Economics, an agency whose job would be to disseminate current market information and "help the small business men to keep themselves as well informed about trade conditions as their big competitors.'

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The proposed bureau, which would be set up as a division of the Commerce Department of the Federal Trade Commission, depending upon which is the more successful in the current fight to gain control of the mythical agency, was described by Mr. Murphy as likely to be helpful to his department in the intelligent enforcement of the laws and to business generally in maintaining healthy but orderly competition. Impliedly, he favored Commerce Department control by disclosing that he is holding conversations with Commerce Department officials "looking toward the creation of such a bureau.'

### \$255,000 Special Staff Proposed

Even as the attorney general was discussing the move, it was revealed that President Roosevelt had proposed that Congress appropriate \$255,000 a year for a special staff to be employed by the Commerce Department. The staff of advisers, who would receive a maximum of \$9,000 a year and who would, according to the President's specifications, exemplify "a new kind of ability and a new kind of energy," presumably would help Secretary Hopkins in some undisclosed manner.

Whether they would play a part in the Administration's business appearement program was not made immediately clear, but Budget Director Harold Smith said in an explanatory letter accompanying the President's recommendations that their jobs would be to appraise "the larger problems that affect commerce and industry of the country.'

### NLRB Rules for CIO against Worcester Company

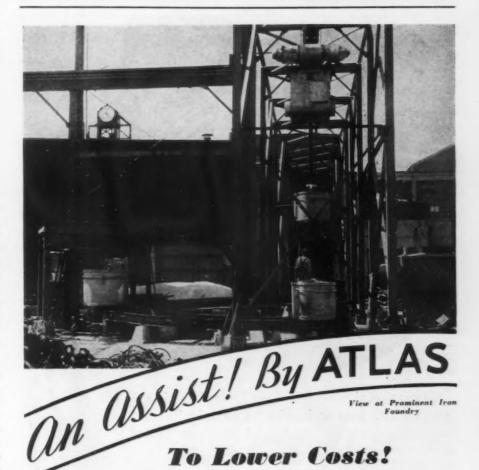
ASHINGTON—Reed & Prince Mfg. Co., Worcester, Mass., has been ordered by the National Labor Relations Board to discontinue the alleged practice of discouraging membership in the CIO's Steel Workers Organizing Committee; to invalidate individual labor contracts with employees; and to reinstate with back pay four employees. Because of lack of evidence the NLRB dismissed the SWOC complaint that the company allegedly had dominated a labor organization.

### Congress Asked to Open Inquiry Into Coal Union

WASHINGTON-The United Mine Workers of America, financial underwriter of the CIO, and its chairman, John L. Lewis, would be subjected to a Congressional investigation covering their activities in the coal fields under a resolution submitted to the House by Representative Hoffman, Republican of Michigan.

The Congressman, who said the issue squarely presented by recent de-

velopments is whether workers can forego their constitutional rights or submit to "the dictation" of Mr. Lewis, sought through his proposed inquiry to learn (1) on what pretense the UMWA assumes to keep men from working without first joining the CIO union; (2) what sums have been collected and spent to influence or prevent workers from going to or from their daily jobs; and (3) whether Mr. Lewis received the assurance of any Federal officials that armed forces would be sent to aid the UMWA in carrying out its demands.



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# Another Lend-Spend Drive By New Deal Seen at Washington

ASHINGTON — Responding to President Roosevelt's request for a study of the causes of idle men, money and machines, industrialists have reiterated before the Temporary National Economic Committee that business must be encouraged through a revision of New Deal

economic policies and by calling off hostility toward private enterprise. The testimony has not been stated that plainly; but in meaning that is its essence,

The suggestions, being fundamental to recovery, are not new but necessarily their importance remains unchanged if the Administration actually desires reasons for continuance of an unprecedented depression, now going into its tenth year. Concern is felt, however, that the Administration, as in the past, will disregard advice from business, and that if it is heeded it will be forced by Congressional initiative which, fortunately, is displaying signs of recovery from the rubber-stamp era.

#### Relief This Session Unlikely

Slow-footed moves toward tax revision and amendments to the Wagner Act are being made by Congressional leaders who are chafing because of dilatory and evasive tactics by the Administration. Nevertheless, there is a minimum of optimism that the present session of Congress will see much done in the way of giving business relief in any substantial degree, either by way of tax, labor or other legislation.

The Administration, like members of Congress, is keenly anxious to see recovery get under way quickly, realizing the political danger that will be faced in 1940 if the enormous unemployment rolls are not cut down sharply and idle machinery is not put back to work. Despite this, the Administration, perhaps for face-saving reasons and because it is fearful of losing the favor of large segments of labor and relief groups, is standing out against any cardinal changes in its "economic and social reforms."

Instead of acceding to pleas for any considerable reconstruction of its policies, there is strong indication that the New Deal is preparing to resort to another huge lending - spending orgy, disregarding the fact that this expensive, tax-eating artificiality has been one of the primary causes, rather than a cure, of the continued depression. There are within the Administration realistic groups which are vigorously urging another big shot in the arm by lavish Government expenditures and which apparently believe it necessary to provide business stimulation for its political effect in a Presidential campaign year. Others further to the left still harp on the failure of the "capitalistic" system and profess to see no way out except through increased and continued Government largesse and control.

### Nothing But Shadow-Boxing

This trend has clearly disturbed business and, barring Congressional action to defeat it, has led to the misgiving that the TNEC inquiry will prove to be nothing more than shadow-boxing. The important issue un-



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70-THE IRON AGE, May 25, 1939

derlying the current hearings before the committee is readily conceded and vital testimony is being presented on the subject by prominent men in the business, economic and academic life of the country, just as the President himself raised important questions in his message recommending the study. Despite this, concern is felt that the Administration attitude only reflects a desire for approbation—which is not forthcoming—rather than for advice and that the latter will go largely if not entirely unheeded.

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The President asked whether idleness of money and men was because "our economy is leaving an era of rapid expansion and entering an era of steadier growth, calling for relatively less investment in private goods."

Though he did not specifically tie it to the White House inquiry, a significant answer was made by Chairman Alfred P. Sloan of the General Motors Corp. when he called the committee's attention to the tremendous need for new metal-working production equipment.

### Capital Goods Employment

Stating that 70 per cent of such equipment was said to be 10 years old in 1935, Mr. Sloan asserted:

"Just see what a wonderful thing it would be if we could stimulate the replacement of the new for the old. We get lower cost, we get a better quality output, and we free employment to the capital goods industry that you know should absorb half of the unemployment."

Dr. Isador Lubin, Commissioner of Labor Statistics and Labor Department representative on the TNEC, inquired whether, if 70 per cent of the nation's metal working equipment were replaced, it would cost as much to replace as has been written off.

"I think it could cost a little more but not a great deal of difference, dealing . . . in very general terms," Mr. Sloan replied.

Mr. Sloan, agreeing with other witnesses from industry, urged encouragement to business through tax and bankruptcy reforms. At a press conference later he said the Administration could encourage business by reiterating its faith in the profit motive, by lending its strength to tax revision efforts and by working toward a balanced budget through reduced expenditures rather than increased taxation. Idle men, money and machines, he said, are being matched by idle opportunities.

"We must do something about it,

not merely talk about it," Mr. Sloan said. He declared that idle opportunities "are all around us for stimulation and improvement of business."

He told the committee that he does not believe the automobile industry has reached a point of stabilization or saturation, adding that as the national income may go up, the industry should also go up at an increasing rate. Advising that the lack of confidence in profit making in private enterprise underlies the failure of business to make greater use of idle credit, Mr. Sloan urged reconstruction of the present tax structure. He proposed elimination of the capital gains tax to "give more flexibility to capital to flow into new enterprise" and complete elimination of the undistributed profits tax.

He expressed the view that there would be no war, making this observation after stating that activity in the automobile industry would continue this year at about the present rate unless "some strong outside influence like a war in Europe" should be felt.



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# Small Companies Oppose Walsh-Healey Act's Broadening

W ASHINGTON — Proposals to broaden the Walsh-Healey Public Contracts Act were opposed by spokesmen for small independent steel companies last week on the ground that an added cost burden would be imposed on small mills and greater

concentration in the steel industry would be promoted.

Appearing at public hearings before a Senate Education and Labor Subcommittee, H. P. Bigler of the Rail Steel Bar Association asked that the law be amended to permit a wage differential between large and small mills and that the term "locality," the subject of the current controversy between members of the steel industry and the Labor Department, should be clarified to remove all doubt as to its scope.

Hugh Daley, president of the Sweet's Steel Co., Williamsport, Pa., told the committee that labor costs under the suspended steel wage order, under which his company would be forced to pay a minimum wage of 62.5c. an hour, would increase labor costs by 30 per cent. He estimated that Government business amounts to 50 per cent handled by the company.

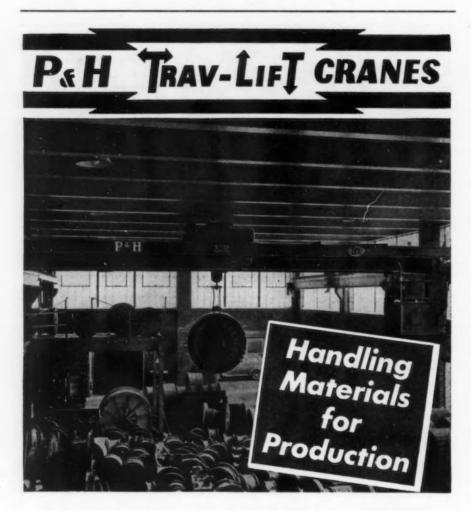
G. O. Hodge, of the Phoenix Iron Co., Philadelphia, testified that when the Walsh-Healey law first went into effect it reduced Government business for his company by from 1.5 to 3 per cent. If the present provision including bringing contracts of \$10,000 under the law is broadened to include \$2,000 contracts and over, as proposed in the pending bills, the company's Government business will be reduced by 80 per cent, he said.

A. C. Moore, president of the Chicago Railway Equipment Co., Chicago, asked repeal of the law to end what he called conflicting jurisdiction with the Fair Labor Standards Act and undue restrictions placed on manufacturers bidding for Government contracts. The witness, who appeared on behalf of the National Association of Manufacturers, characterized the existing law as "entirely devoid of common sense and without justification" since it was enacted to salvage labor standards required under NRA codes after the collapse of the Blue Eagle, and has been succeeded by the wage-hour law.

Under pending bills proposed by Senator Walsh and Representative Healey, both Democrats of Massachusetts, the present law would be broadened by subjecting minimum wage violators to penalties amounting to double the amount of wages due; by including sub-contractors under its provisions; by bringing shipbuilding contracts awarded by the Maritime Commission under the law; and by extending coverage to all contracts in excess of \$2,000.

### Railroad Inventories Decline 17 Per Cent

WASHINGTON — The railroads on Jan. 1, 1939, had approximately 17 per cent less money tied up in materials and supplies than one year ago, according to the Association of American Railroads. The same source said that railroad tax payments in 1938 were equal to the total revenue from the transportation of 3,638,000 carloads of freight.



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### Steel Contracts By U.S. Government \$281,522

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WASHINGTON — Government contracts aggregating \$281,522 .-55 for iron and steel products under the Walsh-Healey act were reported to the Department Public Contracts Division, Department of Labor, during the week ended May 13. Machinery contracts amounted to \$434,892.55, and awards for transportation equipment totaled \$904,209.92.

Details follow:

### Iron and Steel Products

National Tube Co., Washington, D. C., steel flasks	\$11,571.55
Messinger Bearings, Inc., Phila.,	24,540.00
Judson Steel Corp., Oakland, Col., bars, steel	12,576.00
Columbia Steel Co., San Francisco, steel reinforcing bars	79,900.00
Alan Wood Steel Co., Conshohocken, Pa., steel, plates, sheets	Indefinite
Kansas City Structural Steel Co., Kansas City, Kan., steel plates	11,680.00
Carnegie-Illinois Steel Corp., Washington, D. C., angles, structural; eye beams, tees	16,000.00
Lukens Steel Co., Coatesville, Pa., steel, plates	18,222.00
Central Iron & Steel Co., Harris- burg, Pa., steel, plates, sheets	92,069.00
International Steel Co., Evansville, Ind., structural steel	14,964.00

#### Non-Ferrous Metals and Alloys

e American Brass Co., Water-ury, Conn., cartridge brass discs.\$195,475.00

#### Machinery

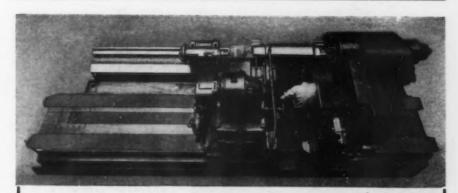
Machinery	
Pratt & Whitney Div., Niles-Bement- Pond Co., Hartford, Conn., pre- cision lathes	\$10,488.00
Gisholt Machine Co., Madison, Wis., balancing machines	17,560.00
James M. Motley & Co., Inc., New York, hammers, drop forge	14,444.00
The G. A. Gray Co., Cincinnati,	93,133.00
Equipment & Supplies, Inc., Washington, D. C., sawmills	41,898.30
S. A. Woods Machine Co., Boston, machining, shell	83,880.09
Jones & Lamson Machine Co., Springfield, Vt., lathes, turret	15,957.00
The Warner & Swasey Co., Cleve- land, lathes, turret	45,391.00
Foote Bros. Gear & Machine Corp Chicago, gate hoists	41,577.16
C. H. Wheeler Mfg. Co., Philadel- phia, winches, deck	53,974.00
Hetherington & Berner. Inc., Indianapolis, loess drying unit	16,590.00

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### Railroads Ask Steel Freight Rate Revision

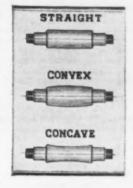
WASHINGTON—Interested W railroads have applied to the Interstate Commerce Commission for fourth section relief on shipments of iron and steel products in carloads from Alabama City, Attalla and Gadsden, Ala., to eastern port cities. The commission has announced that those desiring a hearing should make a request for that purpose within 15 days from May 18. Otherwise, it was stated, the commission may proceed to investigate without further or formal hearing.

The commission also has authorized the Motor Express & Terminal Corp., Brooklyn, to put into effect a commodity rate of 15c. per 100 lb., minimum 30,000 lb., on tin plate, in straight truckloads, or in mixed truckloads, which may not exceed 10 per cent of the total load, between Philadelphia and Camden, N. J., on the one hand, and New York and grouped points, on the other.



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### Standards Bureau Metallurgical Committee Meets

WASHINGTON—The 24th meeting of the Metallurgical Advisory Committee to the National Bureau of Standards was held at the Bureau on May 9, with 34 members in attendance. The first meeting of the committee was held April 14, 1914. Originally only problems in non-ferrous metallurgy were dealt with, Later,

a ferrous committee was organized, and some time afterward the two committees were combined. Meetings are now held alternately in the spring and fall at intervals of one and one-half years, so that the next will take place in the fall of 1940.

The committee is composed of representatives appointed by the principal metallurgical technical societies, plus certain "members at large" who are prominent specialists in certain fields. The chairman is Dr. G. B. Waterhouse, professor of metallurgy, Massachusetts Institute of Technology. The

object of the committee is to advise the Bureau on technical methods of conducting its researches and to offer suggestions concerning the practical value of contemplated projects. In addition to the committee members, the chairmen of all ASTM committees dealing with metals were invited to attend as guests.

### **Projects Discussed**

The following projects were presented for discussion: Copper-base ingot metals "85-5-5-5"; elastic properties of cast iron; foundry sands; "elemental" iron; refractories for use in melting high-purity metals; "gases" in metals; plastic deformation of metals; pipe corrosion; water-treatment to retard corrosion of steel: weathering of aircraft sheet metals; treatments for improving the permanence of magnesium alloys; roofing materials; painting of steel to be used in building construction; silver research project; high-temperature creep of metals; low-temperature properties of aircraft structural metals-impact resistance; thermal transformations in steel and grain size; quality of carbon steels; weather exposure of aircraft sheet metals; accelerated testing to determine susceptibility of aluminum alloys to intercrystalline corrosion; does continued fatigue-stressing of a steel below its endurance limit seriously affect the metal?; significance of a ductility requirement in specifications for metals; study of torsion-impact tests; soldered joints in copper tube plumbing; improved metallographic technique; fatigue of chromium-plated steel; new microhardness tests; oxide coloring of steels; elastic properties of high strength aircraft structural metals; and standard chemical analytical samples.

### Aircraft Requirements

Of these projects, two were of unusual interest to the committee. One of these was the first on the above list. It described the cooperative study which the bureau has made with the Non-Ferrous Ingot Metal Institute. The second (the 21st on the list) was in the nature of an answer to a question of great moment in the field of aeronautics, that is, the effect of continued fatigue stressing of steel below its endurance limit. So far, work on a typical alloy, which has been conducted in cooperation with the National Advisory Committee for Aeronautics, has shown no detectable deleterious change, at least at room temperature. However, according to present indications, it may be necessary to expand the scope of this project to meet the needs of other Federal aircraft agencies.



### J. R. Brackett Takes Henderson's TNEC Post

WASHINGTON — James R. Brackett has been appointed executive secretary of the Temporary National Economic Committee, succeeding Leon Henderson, who was re-cently confirmed by the Senate as a member of the Securities and Exchange Commission. Mr. Brackett's duties will be largely of an administrative character and for the present Mr. Henderson will continue to supervise the economic coordination of the committee's studies. Mr. Brackett has been assistant to the executive secretary. He came to the committee shortly after it was organized from the Securities and Exchange Commission, where he was on the publicity staff. He was a correspondent for the Associated Press in Washington and New York from 1930 to 1935, writing largely on economic and financial affairs. During 1928 and 1929, he was employed on the Paris edition of The New York Herald Tribune.

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### NLRB Finds for CIO Against American Brake Shoe

WASHINGTON—The American Brake Shoe & Foundry Co., Pittsburgh, has entered into a stipulation with the National Labor Relations Board, and the NLRB has ordered the company to offer reinstatement with back pay totaling \$15,183 to 12 employees, to instruct supervisory officials to refrain from discussing labor affiliation in conversations with employees, and to end alleged interference with any labor organization, including the Amalgamated Association of Iron, Steel & Tin Workers, CIO affiliate.

# Thin-Walled Crucibles By Slip Casting Method

WASHINGTON — The Department of Commerce has announced that the metallurgy division of the National Bureau of Standards has succeeded in making crucibles with very thin walls, which possess exceptionally high mechanical strength, hardness, and resistance to "thermal shock." These crucibles are prepared from several of the refractory oxides using the "slip-casting" method similar to that used in ceramic work. By

suspending the finely ground particles of the refractory in absolute alcohol instead of in water, magnesia crucibles, a very desirable type for certain work, have been produced for the first time by slip casting, it was said.

Before new alloys can be produced or existing ones improved, it is necessary to determine the properties of metals in a pure state, which is an important and difficult part of the Bureau's work. The nature of the crucible in which the metal is melted is of fundamental importance, since contamination may readily occur if it is made of improper material. Generally, suitable crucibles are not available commercially but must be made specially for each particular project. By using this new method to produce crucibles of excellent quality from whatever refractory seems most desirable, one of the principal obstacles will be removed in the production, for example, of pure iron.



### Heil Addresses 41st Annual Metal Trades Convention

HICAGO — The 41st annual convention of the National Metal Trades Association was held May 24 and 25 at the Palmer House in Chicago. The feature address on "Partners—Men and Management" was delivered at the banquet Wednesday night by Julius P.

Heil, governor of Wisconsin and a prominent Milwaukee industrial leader. Also at the banquet, Col. Roscoe Turner, famous flying expert, discussed "Speed in Aviation."

Panel discussions were held and N.M.T.A. committee reports given on job rating and merit or employee rating, Wednesday morning. At the luncheon that day, an interesting talk and demonstration was given by Dr. Phillips Thomas, research engineer, Westinghouse Electric & Mfg. Co.

Wednesday afternoon, George H. Houston, an industrial management and financial reorganization consultant of many year's standing, discussed "The Future Demand for Capital Goods in the United States."

An account of international affairs was provided by William McCulloch, foreign news editor, *The Spectator*, Hamilton, Ont.

A former congressman from Indiana, Samuel B. Pettengill, who was known while in Washington as an advocate of the American system of free enterprise, spoke on "The Liquidation of Thrift," while David R. Clarke, Fyffe & Clarke, Chicago, and counsel for the association, closed the day's program with his remarks on legislation affecting industrial relations and other industrial problems.

Dr. Otto P. Geir, of Cincinnati Milling Machine Co., talked on employee hospitalization and other phases of industrial medicine. John W. O'Leary, chairman of the Machinery & Allied Products Institute, discussed recent events in Washington.

Closing this year's meeting was a skit prepared by George A. Seyler, works manager, the Lunkenheimer Co., Cincinnati, entitled, "Ask the Boss."

N. W. Pickering, Farrel-Birmingham Co., Inc., Ansonia, Conn.; A. H. Timmerman, Wagner Electric Corp., St. Louis, and Roe S. Clark, Package Machinery Co., Springfield, Mass., were reelected president, first vice-president, and second vice-president and treasurer, respectively.

Elected as councilors for two years were: H. Follette Hodgkins, W. C. Lipe, Inc., Syracuse, N. Y.; C. T. Winegar, Chrysler Corp, Detroit; Louis Ruthenburg, Servel, Inc., Evansville, Ind.; J. S. Tatman, Roots-Connersville Blower Co., Connersville, Ind.; Otto G. Hitchcock, Hays Mfg. Co., Erie, Pa.; H. W. Butterworth, Jr., H. W. Butterworth & Sons Co., Philadelphia; R. A. Mitchell, Pittsburgh Forgings Co., Coraopolis, Pa.; Dwight K. Bartlett, Builders Iron Foundry, Providence, R. I.; A. L. Frost, Sargent & Co., New Haven, Conn.; William Baker, Baker Brothers, Inc., Toledo; Wilson P. Hunt. Moline Tool Co., Moline, Ill.; C. B. Fitts, Standard Electric Time Co., Springfield, Mass.; A. W. Schneider, Heald Machine Co., Worcester, Mass.

Elected for one year terms as coun-



cilors were: H. H. Kerr, Boston Gear Works, Inc., North Quincy, Mass.; D. P. Sommer, Keystone Steel & Wire Co., Peoria, Ill.; T. H. Doan, The Foote-Burt Co., Cleveland; S. Owen Livingston, Gallmeyer & Livingston, Grand Rapids, Mich.; A. E. Newton, The Collins Co., Collinsville, Conn.; R. G. Wilson, The Challenge Machinery Co., Grand Haven, Mich.; Ernest Dunford, Landis Machine Co., St. Louis.

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ORIGINAL studies of welding, 109 of them, by leaders in various branches of industry are contained in a new book, "Arc Welding in Design, Manufacture and Construction," published by the James F. Lincoln Arc Welding Foundation, P. O. Box 5728, Cleveland. These studies are the outstanding papers of the recent \$200,000 Award Program.

This book, which comprises 1408 pages, 6 x 9 in., and 695 numbered illustrations, contains a tremendous volume of valuable data on welding. With but few exceptions the papers are reproduced completely; those too lengthy for inclusion in their entirety are in the form of comprehensive briefs. All photographs and drawings essential to a clear and adequate presentation of each subject are included. Each study includes designs, calculations, procedures and other pertinent information showing how the advantages attributed to arc welded construction are obtained.

The book is arranged in 10 sections. These, with the number of chapters and pages in each section, are as follows: I—Automotive, nine chapters, 89 pages; II—Aircraft, six chapters, 74 pages; III—Railroad, 11 chapters, 130 pages; IV—Watercraft, nine chapters, 115 pages; V—Structural, 14 chapters, 248 pages; VI—Furniture and Fixtures, seven chapters, 36 pages; VII—Commercial Welding . . . Automotive Repair . . . Welderies, four chapters, 106 pages; VIII—Containers, 11 chapters, 156 pages; IX—Machinery, 29 chapters, 382 pages; and X—Jigs and Fixtures, nine chapters, 65 pages.

Each section begins on a right-hand page: facing on the left-hand page are photographs of authors of that particular section. The book is priced at \$1.50 per copy, postpaid anywhere in the United States; \$2.00 elsewhere.

### Keystone Steel & Wire Acquires National Lock Co.

C HICAGO—The Keystone Steel & Wire Co., Peoria, Ill., last week acquired control of the National Lock Co., Rockford, Ill., one of that city's largest industries. Employing about 3000 persons.

Keystone plans no change in the operations or personnel of the Rockford concern. Reuben Sommer, vice-president of Keystone, was elected chairman of the board of directors, which includes W. H. Sommer, C. W. Laporte, Henry G. Sommer, D. P. Sommer, W. O. Fritze and attorney Theodore G. Baer, all of Peoria. Mark A. Sommer, Peoria, will be executive vice-president.

Lapeer Metal Products Co. will start operations about July 1 at Lapeer, Mich., in the plant formerly used by Lapeer Trailer Corp. and Lapeer Wood Products Co. It will engage in metal stamping and assembly work. The new concern was organized by a group of Detroiters headed by Fred W. Beyers.



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This is the "Heat Prover"—an ingenious device that might be helpful to you. It's a by-product of our research in metallurgy. It registers, continuously and instantaneously, changes in

the amount of oxygen and combustibles in furnace gases. Invaluable in the heat treatment of metals,—assures uniformity and reduces scrap losses. Let us tell you how you can obtain the use of one.

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### SERVICE PROVED INDUSTRIAL OILS

### A.S.T.E. Members Get Tenth Data Sheets

HE 10th mailing of Standard THE 10th maning Data Sheets by the American Society of Tool Engineers has just been made. It consists of 28 sheets and is available to members only. Included in the data sheets are five outstanding tabulations on cast iron, nickel alloy steel and non-ferrous alloys, prepared by International Nickel Co., Inc.

Other data include that on hand reamers and chucking reamers, Arrow Tool & Reamer Co.; Sturdimatic live centers, Sturdimatic Tool Co.; type ML Doall metalmaster contour machine and type V16 Doall contour sawing, and filing machine, Conti-nental Machine Specialties, Inc.; Marshalltown open-back inclinable punch press, Marshalltown Mfg. Co.: drill bushings, liner bushings and clamp bushings, Universal Engineering Co.; Ampco metal and guide pin bushings, Ampco Metal Co., Inc.; Kennametal tools, McKenna Metals Co.; Diamond truing tools (dressers), Arthur A. Crafts Co., Inc.; live centers, Nielsen, Inc.; coolant and lubricant pumps, Pioneer Engineering & Mfg. Co., and arbor presses, Greenerd Arbor Press Co.

### Study of Alloy Steel as Scrap Urged by Barringer

THE necessity for metallurgical research to determine the economic value of alloy and coated steels as scrap was emphasized by Edwin C. Barringer, executive secretary of the Institute of Scrap Iron and Steel, at meetings of the Alabama state committee of the Southern chapter of the institute at Birmingham and the Gulf Coast chapter at New Orleans.

"Concerning alloy - bearing steels and coated material there is an unfortunate lack of definite information," he said. "It is probable that research into the effect of the use of these materials, both upon furnace linings and upon new steel, might develop improved methods of preparation by scrap dealers and new technique by the mills in charging."

# ONTRACTS have been let by

Cleveland Pneumatic Tool

**Opens New Plant May 27** 

LEVELAND - Cleveland Pneu-

matic Tool Co., manufacturer of airplane landing gear struts and pneu-

matic tools, will open its large new

plant addition here May 27 with em-

ployees' families as the guests. Ap-

proximately 2000 persons are expected.

L. W. Greve, president of the com-

pany, will make an address and the

other principal speaker of the evening

will be Col. Roscoe Turner, noted avi-

ator. Following a tour of the plant

the party will be concluded with re-

freshments and dancing. Besides

manufacturing space, the addition pro-

vides enlarged quarters for the engi-

neering department and the office staff.

Battelle Institute to Build

New Research Laboratory

Battelle Memorial Institute, Columbus, Ohio, for construction of a new research laboratory to take care of the expanding volume of industrial research, according to Clyde E. Williams, director. The new construction consists of a wing extending from the end of the present main building that will provide approximately 50,000 sq. ft. of space on five floors. In this will be chemical and metallurgical laboratories, photographic and metallographic departments, physics laboratories, and a large industrial labo-

### Monarch Aluminum Opens **Die Castings Division**

RAYMOND DEUTSCH, president and treasurer of Monarch Aluminum Mfg. Co., Cleveland, recently announced addition of the Dycast Products Division with David Benjamin as general manager. Mr. Benjamin was formerly associated with the Gabriel Co., Cleveland, manufacturer of Gabriel snubbers and automobile accessories. The Dycast Products Division is equipped to produce die castings from aluminum and zinc alloys.

Bulletin on Spring Washers

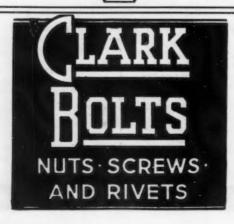
THE Spring Washer Industry has published No. 1 of a series of technical bulletins dealing with fastening problems involving spring washers. Bulletin No. 1 published in April is entitled "Live Action of Spring Washers in Relation to Maintenance of Bolt Tension." Copies of this bulletin are available to interested parties who will address the Spring Washer Industry, 759 North Milwaukee Street, Milwaukee.

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### Welsh Tin Plate Quota Raised Twice; Now 75%

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LONDON—The Welsh tin plate pool committee has sprung a surprise on the trade by deciding to advance the maximum production quota by another 5 points. The increase will operate until July 1. It raises the quota to 75 per cent of allotted output capacity.

The decision was totally unexpected, as it followed an increase from 60 to 70 per cent made the previous day—May 1. The reason for this additional increase is stated to be the receipt without warning of a large order (details of which are not disclosed) which will affect the entire industry for the next two months.

Tin plate manufacturers operate under an agreement whereby they are allotted a production capacity based on an average of their outputs. If they exceed a certain output they pay into a pool; if operating below their allotment they receive payments from the pool. In addition, a "ceiling" quota (now 75 per cent) is fixed beyond which producers must not go. The ceiling is always just above current needs.

As recently as January the Welsh tin plate industry was working at less than 40 per cent of capacity.

### Germany Substitutes Glass for Metals

WASHINGTON—Substitution of domestically produced glass wherever possible for metals and other materials which have to be imported is a subject now engaging the attention of German authorities, according to a report from Consul General R. C. Busser, Leipzig, made public by the Department of Commerce. The use of glass to replace metal is designed to assist the domestic glass industry and to conserve foreign exchange. Glass wool, known as "angels' hair" and used for Christmas tree ornaments, is being produced in large quantities for insulation purposes, replacing other materials. Many factories are installing glass pipe lines for cooking and heating systems, and it is reported that glass pipes are being installed in pri-

Because of this development the German glass industry is working at capacity even though exports of glassware have been steadily declining. In some branches of the industry a shortage of labor has been reported, according to Consul Busser.



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CLEVELAND CAP SCREWS

# PERSONALS.

ALBERT C. ROETH, Jr., has been appointed by the Inland Steel Co., Chicago, as assistant district sales manager of the St. Louis office. He has been with Inland since September, 1933. Starting in the mill at Indiana Harbor, he worked in various departments, then in the general offices at Chicago, where he had extensive experience in the order, engineering and sales departments. During the past two years he has been a salesman in the Chicago district sales office. Mr. Roeth was graduated from Carthage College before going to Inland. He succeeds F. A. Ernst, who was recently transferred to Inland's St. Paul office as district sales manager.

. . .

ROBERT A. NEAL has been appointed manager of the switchgear division, Westinghouse Electric & Mfg. Co., East Pittsburgh. He has been associated with Westinghouse since 1910. He was made assistant manager of the switchboard sales group in 1915 and manager of the entire switch department in 1920. In 1926 he became sales manager for all switchgear apparatus, in 1931 manager of the central station sales department, and later assistant to vice-president.

. . .

J. R. HILL has been appointed assistant sales manager of the Northwestern Steel & Wire Co., Sterling, Ill., to succeed L. A. White, who has resigned.

HUNTER HICKS, for the last five years vice-president of Merchants Steel & Supply Co., Chicago, has been elected president to succeed his father, the late E. John Hicks. E. J. HICKS, JR., has been elected secretary and treasurer.

\* \* \*

DR. JESSE E. STARECK, now engaged in research at the laboratories of United Chromium, Inc., Waterbury, Conn., on May 17 received the Edward Longstreth medal of the Franklin Institute in Philadelphia for his discovery of electrolytic color plating, a new method applicable to the art of coloring metals. Dr. Stareck was graduated from the University of Kansas in 1928. Subsequently he served as an instructor in the chemistry department at the university, receiving his degree of Master of Science in 1931 and his Ph.D. degree at the same institution in 1934. His next

year was spent as a member of the staff of the Kansas City Testing Laboratory, Kansas City, and since 1935 he has been carrying on his work on the further development of electrolytic



ALBERT C. ROETH, JR.

color plating at the Waterbury laboratories of United Chromium, Inc.

. . .

JOHN T. BRITTAIN has been appointed district sales manager in Wichita, Kan., for the Colorado Fuel & Iron Corp., Denver.

. . .

H. J. STAMBAUGH, who has been connected with the Burlington Steel Co., Ltd., Hamilton, Ont., Canada, since 1922, has been elected president, succeeding J. B. CARSWELL, who has resigned. F. C. O'BRIEN, sales manager for the past two years, has been added to the board.

\* \* \*

H. W. Hill, formerly superintendent of the wire division, Northwestern Steel & Wire Co., Sterling, Ill., has been appointed assistant general superintendent. P. M. Murphy, who has been assistant superintendent of the wire department, has been promoted to the superintendency of that department, and V. G. Hotchkiss has been named assistant superintendent of the wire mill. M. E. Goetz is general superintendent of the company.

P. Y. Danley, of the Westinghouse Electric & Mfg. Co., Springfield, Mass., has been elected president of the Air Conditioning Manufacturers' Association. S. E. Lauer, of the York Ice Machinery Corp., York. Pa., is vice-president; P. A. McKittrick, Parks-Cramer Co., Fitchburg, Mass., is treasurer, and W. B. Henderson is executive vice-president.

. . .

C. B. ROBINSON was elected president and a director of the J. B. Ford Sales Co. at the annual directors' meeting. He has been connected with the organization in a sales and executive capacity for 22 years, the last 10 years as general manager. W. F. Torrey, who has been identified with the company for the past six years, has been elected secretary-treasurer.

. . .

WILLIAM S. KNUDSEN, president of General Motors Corp., and CAPT. HAROLD GRAY, Pan-American Airways flier and an aeronautical engineer, have been named to receive honorary degrees from the University of Detroit, June 6. Knudsen will be given the degree of doctor of engineering and Captain Gray, a University of Detroit alumnus and first of 10 pilots to receive the title of "Master of Ocean Flying Boats," also is to receive a doctor of engineering degree. Captain Gray has just completed charting a route for trans-Atlantic service.

S. A. STRICKLAND, president of Bower Roller Bearing Co. since 1932, was elected a director of the Union Guardian Trust Co. recently at Detroit. Mr. Strickland became vice-president and general manager of Bower after having held executive positions with Imperial Bearing Co. and Hoover Steel Ball Co. He is also a director of the Ahlberg Bearing Co. of Chicago. He started with Packard in 1910.

R. F. Moody, for the past two years a member of the development department of the Carrier Corp., Syracuse, N. Y., has joined the sales department of the Wolverine Tube Co., Detroit.

A. C. DANEKIND, of General Electric Co., recently was elected to the board of directors of Carboloy Co., Inc., Detroit, a G.E. affiliate.

WILLARD H. COBB, formerly general factory manager, mechanical rubber goods plant of the United States Rubber Co., has been appointed general manager of the mechanical goods and

general products division of the company.

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R. E. S. GEARE, formerly vice-president in charge of sales and engineering of the L. H. Gilmer Co., Philadel-



GORDON F. HESS, whose appointment as sales manager of the Houston district office of Republic Steel Corp. was announced in these columns last week.

phia, has been appointed general sales manager of T. B. Wood's Sons Co., Chambersburg, Pa.

. . .

James A. Farrell, chairman of the National Foreign Trade Council, received the Captain Robert Dollar annual memorial award at the ninth annual World Trade dinner given at the World's Fair on May 18.

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N. A. Feldman has been appointed purchasing agent of the Claud S. Gordon Co., Cleveland.

. . .

K. B. Brandenburg, who has been identified with the Detroit office of the Baldwin - Duckworth Chain Corp., Springfield, Mass., has been placed in charge of the New York office of the company at 276 Canal Street. He will be succeeded in Detroit by F. T. Lange.

. . .

C. H. KUTHE has been appointed technical advisor to the Michigan division of Revere Copper & Brass, Inc., New York. Mr. Kuthe is a graduate of Case School of Applied Science,

Cleveland, and was associated with the Steel & Tubes Division of Timken Roller Bearing Co. before going with the Revere company.

. . .

George Muscio, for the past five years head of the research laboratory of the Lea Mfg. Co., Waterbury, Conn., has resigned to open a consulting laboratory at 480 Watertown Avenue, Waterbury, serving the metalworking and allied trades. He will be retained by the Lea Mfg. Co. as consultant.

. . .

H. Y. Bassett, formerly in charge of sales of industrial furnace equipment to the non-ferrous industry for the Surface Combustion Co., Toledo, has joined the staff of the Wolverine Tube Co., Detroit, Mich., as research engineer. Prior to his connection with Surface Combustion, Mr. Bassett was identified with the research and metallurgical department of Chase Brass & Copper Co.

A. H. Burnap has been appointed representative in central New York by the American Flexible Coupling Co., Erie, Pa. He will make his headquarters at 940 Lancaster Avenue, Syracuse, N. Y. Eric N. Gilling, P. O. Box 4197, Pittsburgh, has been made sales representative in western Pennsylvania and West Virginia.

# John A. Coe President of Copper-Brass Association

THE Copper and Brass Mill Products Association held its annual meeting at White Sulphur Springs, W. Va., on May 18 and 19 and elected the following officers:

President, John A. Coe, American Brass Co.; vice-president, R. E. Day, Bridgeport Brass Co.; vice-president, Wylie Brown, Phelps Dodge Copper Products Corp.; vice-president, R. L. Coe, Chase Brass & Copper Co.; vice-president, W. M. Goss, Scovill Mfg. Co.; treasurer, C. D. Dallas, Revere Copper & Brass, Inc.; secretary, T. E. Veltfort.

# Fan Manufacturers' Committees Appointed

HENRY MATHIS, president, National Association of Fan Manufacturers, has announced the following committee appointments;

By-laws and rules committee, J. M. Birkenstock; credit committee, H. S. Whiting; engineering committee, G. S. Polk, chairman; finance committee. W.

### ... OBITUARY ...

WILLIAM EDWARD SAVAGE, 49 years old, aeronautical engineer stationed at Wright Field, who died at his home in Dayton, Ohio, on May 9, was buried at Bay City, Mich., his birthplace. Mr. Savage was a graduate of Michigan State College.

. . .

AUTHUR CAVANAUGH O'CONNOR, industrialist, died May 11 at his home in Grosse Pointe Farms, Mich. He was an organizer of the Hanna Furnace Co., Cleveland, and the Weatherproof Body Co., Corunna, Mich., and Cloth Co., the Lochland Land Co. and was a director of the Michigan Wire the Hanna Co.

. . .

CHARLES H. STRAWBRIDGE, president of the Goodman Mfg. Co., Chicago, manufacturer of mine machinery, died at his home last week, aged 67 years. Mr. Strawbridge was a former president of the National Metal Trades Association and a director of the Illinois Manufacturers Association.

CAPT. WILLIAM E. WARNER, 79 year old retired Great Lakes skipper and founder of the Warner Foundry Co., Algonac, Mich., died May 16 in a Detroit hospital. During 45 years on the Lakes, Captain Warner was associated with the Pittsburgh Steamship Co. for 20 years.

. . .

JONATHAN EDMUND BROWNING, one of three Ogden, Utah, brothers who founded the arms manufacturing company that bears their name, died at New Haven, Conn., May 16, having been stricken ill while conferring with officials of the Winchester Repeating Arms Co. He was 80 years old, and the craftsman of his company.

. . .

FREDERICK C. HERSEE, president and general manager of the Cambridge Screw Co., died at his home in Belmont, Mass., on May 16. Mr. Hersee was born and educated in Roslindale, Mass., and manufactured machine products for 40 years. He also was a pioneer in the manufacture of automobile accessories.

Gardner; legislation committee, E. B. Freeman; membership committee, E. Szekely; publicity committee, J. M. Frank; standards committee, F. Herlan, chairman; statistical committee, F. Herlan, chairman; trade relations committee, J. E. Truitt; transportation committee, O. B. Coblentz; N.A.F.M. representative on Blower Systems N.F.P.A., J. O. Lennon.

THE REAL WAY WELL TO

# Production of Ingots, Castings and Rolled Steel in 1938 (As Reported by American Iron and Steel Institute)

### ANNUAL STEEL PRODUCTION (Ingots and Steel for Castings)

		OPEN HEARTH					
Years	Basic	Acid	Total	Bessemer	Crucible	Electric	Total
1920	31,375,723	1,296,172	32,671,895	8,883,087	72,265	505,687	42,132,934
1925	37,087,342	947,146	38,034,488	6,723,962	19,562	615,512	45,393,524
1926	39,653,315	1,038,664	40,691,979	6,934,568	15,493	651,723	48,293,763
1927	37,144,268	924,067	38,068,335	6,191,727	9,036	666,087	44,935,185
1928	43,200,483	913,473	44,113,956	6,620,195	7,769	802,260	51,544,180
1929	47,232,419	1,120,469	48,352,888	7,122,509	6,645	951,431	56,433,473
1930	34,268,316	780,856	35,049,172	5,035,459	2,253	612,599	40,699,483
1931	22,130,398	379,168	22,509,566	3,023,446	1,547	410,942	25,945,501
1932	11,742,682	164,648	11,907,330	1,532,076	645	241,111	13,681,162
1933	20,057,146	324,526	20,381,672	2,428,791	681	421,203	23,232,347
*1934	23,256,417	274,688	23,531,105	2,162,357	531	361,296	26,055,289
1935	30,361,237	354,192	30,715,429	2,835,031	642	541,492	34,092,59
1936	43,114,826	421,302	43,536,128	3,458,457	816	772,455	47,767,85
1937	45,772,510	499,793	46,272,303	3,449,927	934	845,537	50,568,70
1938	25,691,963	272,337	25,964,300	1,880,661	6	505,024	28,349,99

### ANNUAL STEEL INGOT PRODUCTION

	0	PEN HEAR	TH	_		****	Total
Years	Basic	Acid	Total	Bessemer	Crucible	Electric	Total
1920	30,926,393	759,102	31,685,495	8,778,107	70,536	347,254	40,881,390
1925	36,632,060	484,843	37,116,903	6,670,128	17,729	335,978	44,140,738
1926	39,172,688	533,285	39,705,973	6,891,502	13,452	325,278	46,936,20
1927	36,750,387	493,653	37,244,040	6,153,703	7,696	371,278	43,776,71
1928	42,818,557	454,883	43,273,440	6,591,745	6,516	453,692	50,325,39
1929	46,644,206	576,393	47,220,599	7,091,680	5,762	532,392	54,850,43
1930	33,898,518	367,181	34,265,699	5,020,588	1,563	307,418	39,595,26
1931	21,986,933	194,388	22,181,321	3,011,394	831	235,376	25,428,92
1932	11,689,495	104,794	11,794,289	1,528,544	241	141,328	13,464,40
1933	19,972,805	195,495	20,168,300	2,425,779	399	299,808	22,894,28
1934	23,235,688	201,073	23,436,761	2,162,357	531	349,095	25,948,74
1935	30,334,442	248,512	30,582,954	2,835,031	642	521,818	33,940,44
1936	43,070,917	278,406	43,349,323	3,458,457	816	704,213	47,512.80
1937	45,719,507	333,473	46,052,980	3,449,927	934	814,310	50,318,15
1938	25,666,719	194,845	25,861,564	1,880,661	6	468,610	28,210,84

### PRODUCTION OF DUPLEX STEEL

Years	Gross tons	Years	Gross tons	Years	Gross tons
1920	3,279,119	1929	2,961,292	1934	591,373
1925	2,797,318	1930	2,045,277	1935	960,020
1926	2,815,980	1931	945,844	1936	2,099,102
1927	2,184,674	1932	289,263	1937	2,907,890
1928	2,232,197	1933	386,154	1938	1,183,623

### PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS

Years	Ingots	Castings	Total	Years	Ingota	Castings	Total
1920 -	1,591,939	68,353	1,660,292	1932	757,560	41,044	798,604
1925	2,320,390	112,583	2432,973	1933	1,475,400	71,783	1,547,183
1926	2,317,313	146,101	2,463,414	*1934	1,595,544	16,731	1,612,275
1927	2,385,904	145,844	2,531,748	1935	2,087,427	32,231	2,119,65
1928	3.045.225	169,684	3.214.909	1936	2,788,100	95,522	2,883,62
1929	3,764,287	192,920	3,957,207	1937	2,975,598	57,028	3,032,620
1930	2,317,183	126,128	2,443,311	1938	1,434,801	41,547	1,476,34
1931	1,366,010	89,903	1,455,913				

### PRODUCTION OF ALLOY STEEL INGOTS AND CASTINGS BY PROCESSES

Processes	1935	1936	1937	1938
Open hearth steel—basic Open hearth steel—acid	1,633,541 73,400	2,239,885 115,766	2,285,000 146,835	1,052,706 91,151
Bessemer steel	154 412,563	209 527,762	600,550	332,475
Total	2,119,658	2,883,622	3,032,626	1,476,348

### PRODUCTION OF HOT ROLLED IRON AND STEEL PRODUCTS

Years	Iron	Steel	Total
1920	1,377,566	30,970,297	32,347,863
1925	727,275	32,659,685	33,386,960
1926	676,854	34,819,038	35,495,892
1927	544,344	32,334,687	32,879,031
1928	484,977	37,177,939	37,662,916
1929	475,049	40,594,367	41,069,416
1930	316,053	29,196,954	29,513,007
1931	188,726	18,987,168	19,175,894
1932	98,712	10,352,376	10,451,088
1933	130,653	16,604,433	16,735,086
1934	162,140	18,807,366	18,969,506
1935	134,491	23,830,061	23,964,552
1936	201,869	33,599,510	33,801,379
1937	162,357	36,604,032	36,766,389
1938	69,244	20,916,319	20,985,563

### PRODUCTION OF HOT ROLLED IRON AND STEEL PRODUCTS

States	1934	1935	1936	1937	1938
Maine, Mass	158,559	198,790	246,916	230,902	135,562
New York	800,338	959,095	1,440,038	1,831,579	970,652
New Jersey	86,466	94,097	111,047	113,002	75,027
Pennsylvania	5,619,410	6,521,515	10,032,035	11,167,740	5,877,802
Delaware, Md., Va	788,824	977,361	1,367,012	1,768,734	1,297,563
West Virginia	797,039	1,045,051	1,191,403	1,125,382	725,686
Kentucky, Tenn., Ga., Texas		571,732	658,761	· 594,730	367,396
Alabama	628,409	728,390	1,087,414	1,268,175	1,001,121
Ohio	4,301,239	5,401,948	7,697,296	7,754,938	4,642,866
Indiana	2,446,052	3,276,717	4,431,090	4,896,446	2,588,685
Illinois	1,311,243	1,890,251	2,510,249	2,771,172	1,360,097
Michigan, Wis., Minn	923,724	1,467,362	1,708,914	1,980,842	1,137,525
Missouri, Okla	167,112	201,360	315,691	288,808	193,528
Colorado, Wash	246,999	283,793	634,533	545,062	255,599
California, Canal Zone	292,787	347,090	468,980	428,887	356,456
Total	18.969,506	23.964,552	33,801,379	36,766,389	20,985,563

### PRODUCTION OF HOT ROLLED IRON AND STEEL PRODUCTS IN 1938

	Gross tons
FLAT ROLLED PRODUCTS: Plates (sheared and universal)	1,714,13 4,745,41 1,030,23 66,58 34,04 1,503,18 824,32
Total	9,917,92
BARS: Merchant Concrete reinforcement	2,327,84 783,69
Total Bars	3,111,53
Structural shapes Sheet piling Rails Long splice bars, tie plate bars, etc Skelp Blanks or pierced billets for seamless tubes	1,859,54 110,95 622,89 198,66 1,253,16 1,320,47
Wire rods. Car wheels (rolled steel)	2,108,59 58,25 7,40
Rolled forging blooms, billets and axle blanks Blooms, billets, slabs and sheet bars for export All other finished hot rolled products.	110,00
Total	7,956,10
Grand total	20,985,56

# Republic Sues Lewis and Murray For \$7,500,000 Strike Damages

REPUBLIC STEEL CORP. has filed suit under the Sherman and Clayton acts to recover \$7,500,000 strike damages from the CIO, the Steel Workers Organizing Committee, John L. Lewis, Philip Murray, Clinton S. Golden and other officers and organizers of the Lewis unions.

The suit, which also named as defendants nearly 700 individual strikers and minor union officers in Cleveland, Youngstown, Warren, Niles, Canton and Massillon, Ohio, was filed in the United States District Court, Cleveland, and seeks to hold the union leaders and their organizations responsible for the business lost and expenses incurred as a result of an alleged conspiracy in violation of the Clayton and Sherman acts.

In a similar suit a Federal grand jury at Philadelphia recently awarded the Apex Hosiery Co. damages of \$711,932 against the CIO's American Federation of Hosiery Workers.

Republic charges that the unlawful acts of force, intimidation, threats, violence, destruction of property, injury of persons and obstruction of commerce to and from its plants were part of a conspiracy to compel the company to sign a proposed collective bargaining agreement with the SWOC.

### Triple Damages Sought

63

Damages directly sustained as a result of the SWOC strike activities in Republic plants during the summer of 1937 are set by the petition at a minimum of \$2,500,000. Under the Clayton Act the company is entitled to recover any proved damages threefold.

The basis of its claim, Republic declares, includes losses incurred by the forced closing of plants at Cleveland, Youngstown, Canton and Massillon, the abnormal cost of operating under siege by strikers at Warren, Niles and some of the Canton plants, the cost of protecting properties and persons against harm by strikers, and the loss of business due to blockading of plants which resulted in loss of sales and inability to contract for delivery of products over a period of more than six weeks.

### **Wysor Signs Complaint**

The steel company's petition to the Federal court, signed by R. J. Wysor, president, and Republic attorneys, carried a list of complaints which included charges that the SWOC-CIO defendants:

"Caused large numbers of the employees at said plants . . . to be shot at with firearms, assaulted with missiles, and threatened with harm for the purpose of coercing and forcing them to quit their employment at such plants.

"Caused many of the employees at some of the said plants to be abducted while going to or from their work at said plants, carried them by automobile or otherwise to various points where they were subjected to beatings, threats or other acts of intimidation and coercion for the purpose of preventing them from continuing or resuming their work at said plants.

"Caused armed mobs to assemble and march to plants which had been closed as a result of their acts as herein alleged for the purpose of preventing the reopening of or resumption of work at said plants."

Included among the individuals named as defendants in the suit, according to Republic attorneys, are 47 who were arrested and convicted on charges based on illegal acts of violence committed in conjunction with the strike.

CIO leaders who are being sued individually and as officers of the Lewis organizations (in addition to Messrs. Lewis, Murray and Golden), include David J. McDonald, SWOC treasurer; Van A. Bittner, SWOC leader in the Chicago area; Harold J. Ruttenberg, SWOC research director; Vincent Sweeney, SWOC publicity director; John Owen, CIO leader in Ohio, and S. H. Dalrymple and James Carey. presidents of CIO unions. The Republic petition also named as defendants John L. Mayo, SWOC leader in the Youngstown area; Robert Burke. picket captain during the 1937 strike: John Steuben, Joseph F. Gallagher. and other strike leaders.

### SWOC Set Strike's Cost to Republic At \$13,038,463

THE SWOC, making its own appraisal of the loss suffered by Republic Steel Corp. during the steel strike of 1937, on April 15, 1938, estimated this loss at \$13,038,463.

Steel Labor, SWOC publication, presented the following analysis of Republic's 1937 earnings:

"Tom Girdler's refusal to deal with a legitimate union and sign a contract cost Republic Steel Corp. \$13,-038,463. This is computed from figures in the official annual report of Republic Steel. It was all due to Girdler's refusal to deal with the union. Notice these facts:

"The manufacturing cost of products sold by Republic in 1937 amounted to \$207,576,922. Included in that amount are:

"Cost of materials	
"Wages and salaries	88,609,601
"Property taxes	9,334,681
"Repairs, maintenance	21,623,425
"Total	3184,538,459

"Also included in 'manufacturing cost of products' is 'strike expense.' But nowhere else in the report is the 'strike expense' item broken down. Therefore, the difference between all the times which make up 'manufacturing cost of products' and the total of

\$207,576,992 would leave the total of 'strike expense.' Here it is:

"Manufacturing costs ....\$207,576,922 "Materials, wages, etc..... 184,538,459

"Total strike expense..... \$13,038,463"

### SWOC Leader Calls Situation "Suicidal"

CLEVELAND — James Donovan, in charge of the Cleveland office of SWOC, said after the Republic strike damage suit had been filed:

"We are confident justice will be done. We stood prepared then and are prepared now to sign a contract with Republic to end this suicidal warfare."

### SWOC Asks Back Pay From Republic Steel

L. LODISH, acting regional director of the National Labor Relations Board at Cleveland, revealed this week that claims for back pay for 6200 persons had been filed with him recently against Republic Steel Corp., growing out of the strike in 1937.

Officials of the Steel Workers Organizing Committee estimate that the total amount involved is around \$7,500,000, although the claims are individually filed and divided into three geographical groups, presumably to facilitate hearings at three cities. Republic has not been officially notified of the claims, said Lodish.

# THE NEWS IN BRIEF.

- Steel Warehouse Association convention hears C. R. Hook defend profits system.-Page 38.
- Auto production over 80,000 mark as five-day week is resumed temporarily. Many plants to close for entire holiday week just ahead. Estimates vary on steel tonnages placed for 1940 models.-Page 60.
- E. L. Stettinius, Jr., tells TNEC of U. S. Steel Corp.'s financing policies.-Page 64.
- CIO attempts to link AFL to manufacturers in Wagner Act dispute. -Page 67.
- Department of Justice opens investigation into building costs.-Page 68.
- NLRB rules for CIO against Reed & Prince Mfg. Co., Worcester, Mass. -Page 69.
- Hoffman bill would provide congressional inquiry into mine union activities.-Page 69.
- Another lend-spend drive by New Deal is forecast at Washington .- Page 70.
- Railroad inventories declined 17 per cent during 1938.-Page 72.
- Small steel companies oppose broadening of Walsh-Healey Act .-Page 72.
- Steel awards by Federal Government \$281,522 in latest reported week. -Page 73.
- Railroads ask steel freight rate revision on shipments from South .-Page 73.
- Bureau of Standards announces making of thin walled crucibles by slip casting .- Page 74.
- Bureau of Standards Metallurgical Advisory Committee meets. -Page 74.
- NLRB issues order for CIO affiliate against American Brake Shoe & Foundry Co.—Page 75.
- J. R. Brackett takes Leon Henderson's TNEC post.—Page 75.
- Julius P. Heil, Wisconsin governor, addresses National Metal Trades Association convention.-Page 76.

- Lincoln Foundation award papers in book form .- Page 77.
- Keystone Steel & Wire Co. acquires National Lock Co., Rockford, Ill. -Page 77.
- American Society of Tool Engineers mail 10th standard data sheets.-Page 78.
- Cleveland Pneumatic Tool Co. will open new plant May 27 .- Page 78.
- Study of alloy steel as scrap is urged by Scrap Institute secretary .-Page 78.
- Monarch Aluminum Mfg. Co., Cleveland, forms division to produce

### Battelle Institute builds new research

aluminum and zinc alloy die cast-

laboratory.-Page 78.

ings .- Page 78.

- Spring washer industry publishes first of technical bulletin series.-Page 78.
- Germany substitutes glass for metals to conserve foreign exchange.-Page 79.
- National Association of Fan Manufacturers announces committee appointments .- Page 79B.
- John A. Coe is elected president of the Copper and Brass Mill Products Association.—Page 79B.
- Production of ingots, castings and rolled steel in 1938.—Page 79C.
- Republic Steel sues John L. Lewis, Philip Murray, CIO and SWOC for \$7,500,000 strike damages.— Page 79D.
- SWOC leader at Cleveland calls Republic situation "suicidal."-Page
- SWOC files claim for \$7,500,000 back pay with NLRB.—Page 79D.
- SWOC set 1937 strike cost to Republic Steel Corp. at \$13,038,463.—Page
- Hobart Mfg. Co. gives plant expansion contract to Austin Co.-Page 82.
- Reich standardizes, simplifies automobile production.—Page 82.
- United States Steel Corp. coal mines reopen, continue under open shop. —Page 83.
- Youngstown Sheet & Tube will offer some workers extra pay instead of vacations .- Page 83.
- 70,000 automobile workers idle as strike is called at Briggs plant .-Page 85.
- Society for Metals nominates officers. Page 85.
- Modernization of U. S. Steel plants made jobs, E. R. Stettinius tells TNEC.-Page 100.

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### MEETINGS

- May 22 to June 8—Society of Automotive Engineers, world congress, in various cities.
- May 25 to June I—Triple Convention ay 25 to June I—Iriple Convention (American Supply and Machinery Association, the National Supply and Machinery Distributers' Association and the Southern Supply and Machinery Distributers' Association), on board the S.S. Monarch
- June 5 and 6—Associated Machine Tool Dealers, Schenectady.
- June 19 to 22—American Electro-platers' Society, Asbury Park, N. J.
- June 26 to 30-American Society for Testing Materials, Atlantic City,
- Oct. 23 to 27-National Metal Congress, Chicago.



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# Hobart Mfg. Orders Expansion to Plant

CLEVELAND—Hobart Mfg. Co., Troy, Ohio, plans to build a three-story reinforced concrete plant addition and a new brass foundry. Contracts have been awarded to the Austin Co. here. The three-story building will be devoted to the manufacture of electric coffee mills, meat choppers and slicers. The foundry will be of monitor type with cement tile roof deck.

"Steady growth of both overseas and domestic business has made this enlargement of our manufacturing facilities imperative," said John M. Spencer, president of Hobart.

### ... PIPE LINES ...

Michigan Consolidated Gas Co., 415 Clifford Street, Detroit, plans new welded steel pipe line from point near Milan, Mich., to Ann Arbor, Mich., about 21 miles, for natural gas transmission to latter district, where control station and other operating facilities will be installed. Connection will be made at first noted point with main pipe line of company from Detroit, transporting gas from Texas Panhandle area. Improvements will be made in pipe line system at Ann Arbor, where change-over will be made from artificial to natural gas. Local distribution will be carried out by Ann Arbor division of Michigan Consolidated company, formerly Washtenaw Gas Co. Work will begin in June. Cost close to \$150,000.

Jack W. Frazier, Esperson Building, Houston, Tex., oil and gas operator, plans welded steel pipe line from gas field at Eureka to Magnolia Park district, Houston, about 22 miles, for natural gas transmission to cityowned station at latter place. Work will begin soon.

Purchasing and Contracting Officer, Quartermaster Corps, Fort Benning, Ga., asks bids until May 29 for 2400 ft. of 1½-in., 3900 ft. of 1-in., and 1200 ft. of 3½-in. steel pipe (Circular 148-135).

Socony-Vacuum Oil Co., 26 Broadway, New York, plans 10-in. welded steel pipe line from Sandoval, Ill., oil field to Patoka, Ill., about 11 miles, for crude oil transmission. Connection will be made with pipe line gathering system of Magnolia Petroleum Co., Dallas, Tex., a subsidiary, in Salem-Lake Centralia area at Sandoval, while at Patoka new line will join with another welded steel pipe line to be built by company in conjunction with recently announced lines from Woodriver, Ill., to Lima, Ohio. A bulk station, with two 80,000-bbl. steel tanks, pumping plant and other facilities will be built at Patoka. Work will be carried out under supervision of Magnolia company.

Quartermaster, Fort Screven, Ga., asks bids until June 9 for steel pipe (Circular 826-31).

Safford, Ariz., will take bids soon for about 160,000 ft. of 1 to 8-in. diameter steel pipe for municipal natural gas distribution system, with largest size for welded steel pipe line connection with new system of El Paso Natural Gas Co., El Paso, Tex., now in course of construction, which will furnish supply. Control station and other operating facilities will be installed at Safford. Bond issue of \$135,000 has been authorized for project. Weiland Engineering Co., Pueblo, Colo., A. A. Weiland, head, is consulting engineer.





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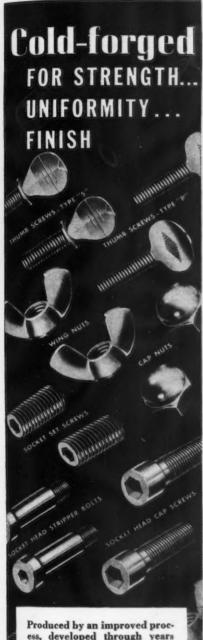
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### U. S. Steel Corp. Coal Mines Stay Under "Open Shop"

PITTSBURGH - "Captive" coal mines, owned and operated by steel companies, started production this week under terms identical with those which existed prior to the general mine strike tie-up on April 1.

Some of these mines were working under open shop agreements with the United Mine Workers, others were working under provisions which existed at the time when they had signed agreements with the union, while a number of mines had agreements with independent coal miners' unions.

The contracts of extension entered into last week between United States Steel Corp. coal mining companies and the United Mine Workers will remain in effect until April 1, 1941, and contain without change the identical form of the open shop contracts which have been in effect the past two years.

The United States Steel Corp. coal contracts and those agreed upon by some other steel companies, are not "union shop" contracts such as were signed 10 days ago by commercial mines. Under the "captive" mine contracts held by the United Mine Workers, the latter is collective bargaining agency for only those employees who are members of its union.

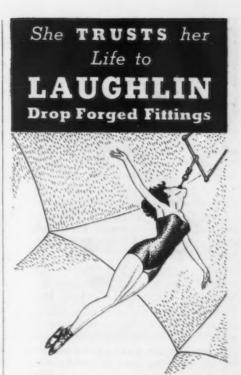
Some "captive" mines had signed open shop agreements with the United Mine Workers but these were discontinued in 1937, although the mines continued and will continue to work under the same conditions of employment as were contained in the old contract.

The "penalty" clause is not a part of captive mine contracts.

### Sheet & Tube Offers Extra Pay or Vacation To Some

7OUNGSTOWN. - The vacation Youngs-or mill workers of Youngstown Sheet & Tube Co. this year includes special vacation pay provisions which will enable those employees who lost much work in the last six months to make up some of their pay

Persons who worked less than an average of 16 hr. per week need not take vacation time off but will get the vacation pay allowance. Those who worked 16 to 24 hr. need take only half of their vacation time. Those who worked over 60 per cent time during the past six months will get full vacation pay allowance and must take the time off.



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### CANADA .

. . . Export backlogs continue to bolster production

ORONTO, May 23-While the Canadian iron and steel industry is maintaining fairly high operating schedules and new business is appearing in better volume than formerly, large tonnage awards for spot and future delivery are lacking. The automotive industry and various branches of electric manufacture are providing most of the new business, while little demand is reported from sanitaryware and radiator concerns. Sheet sales have advanced considerably in the past two or three weeks, and there has been some improvement in bars, both from the mills and the jobbers. Reinforcing bars also have come into more prominence recently and contracts now are pending for about 3000 tons, the largest job being the new postal terminal at Toronto, for which about 1000 tons will be required. Mills continue to report good backlogs with almost capacity operations, backlogs being mostly for export. Despite the fact that there have been severe price re-

ductions in the United States markets. Canadian steel interests has made no revision in their price lists.

Some of the larger pig iron melters are covered for immediate needs and are not in the market. Most of the new business is coming from the smaller users

### CAST IRON PIPE

La Marque, Tex., plans pipe lines for water system, including main 6-in. line, elevated tank and tower, and other waterworks installation. Cost about \$100,000, of which \$72,-000 is being arranged through bond issue.

North Middletown, Ky., will take bids soon for water pipe lines and other waterworks in-

Forbes, Richmond, Ky., is consulting engineer.

Board of Awards, Baltimore, has low bid at \$136,821 from John Matricciani, 229 South Exeter Street, for main water supply line in

Southeastern district.

Fulton, Ill., plans pipe lines for water system and other waterworks installation. Cost about \$50,000. Caldwell Engineering Co..

Jacksonville, Ill., is consulting engineer.

Pittsville, Wis., will take bids soon, closing on or about June 8, for pipe lines for water system and other waterworks installation, including elevated steel tank and tower, motor-driven pumping unit and accessories. Cost cluding elevated steel tank and tower, motor-driven pumping unit and accessories. Cost about \$52,700. Financing has been arranged through Federal aid. A. Lawrie Kurtz, 739 North Broadway, Milwaukee, is consulting

Amherst. Wis., plans pipe lines for water Amherst, Wis., plans pipe lines for water system and other waterworks installation. Financing will be arranged through Federal aid. A. E. McMahon Engineering Co., Menasha Wis., is consulting engineer.

Black Creek, Wis., plans pipe line extensions in water system; also installation of system water with sewage treatment when

ewage system, with sewage treatment plant Financing will be arranged through Federal aid. A. E. McMahon Engineering Co., Menasha, Wis., is consulting engineer.

Father Flanagan Boys Home, Boys Town Neb., plans pipe line from connection with system of Metropolitan Utilities District, near city limits of Omaha, Neb., for main water supply; also improvements in local system. including new booster pumping station. Cost about \$40,000.

Moorhead, Minn., has approved plans for about 2½ miles of new mains for extensions and replacements in water pipe lines. Cost about \$52,800. Financing has been arranged through Federal aid and will begin work at

Lonsdale. Ark., plans pipe lines for system and other waterworks installation. Financing will be arranged through Federal

Reading, Pa., is arranging for early pur-chase of cast iron water pipe for extensions and replacements in system. R. E. Kiebach is city purchasing agent.

Los Angeles Department of Water and Power has awarded 246 tons of 12-in. pipe to American Cast Iron Pipe Co., Los Angeles, and 246 tons to National Cast Iron Pipe Co. Los Angeles.

South Pasadena, Cal., has opened bids on

Yakima, Wash., has opened bids on 1200 tons of 2, 6, 8, and 12-in. pipe; purchase contingent on WPA approval.



# 70,000 Automobile Workers Idle as Strike is Called at Briggs Plants

STRIKE in the seven plants of Briggs Mfg. Co., Detroit, called last Monday morning at 9 a.m. appeared likely to keep nearly 70,000 auto workers out of their jobs at least until June 5. Settlement which would enable plants to reopen before that date appeared unlikely as The Iron Age went to press. The strike has made idle 15,000 Briggs workers and most of the workers in 10 Chrysler Corp. plants in the Lincoln division of Ford Motor Co., in parts of the L. A. Young Spring & Wire Co., National Automotive Fibre plants, in several smaller parts plants, in Budd Mfg. Co. plants and even has started to affect automobile carriers on the Great Lakes which will tie up at Detroit if manufacturers stop shipping automobiles.

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Despite the arrival of James F. Dewey, federal labor conciliator, to offer his services in negotiating a settlement, no negotiations were

scheduled and neither the union nor the employers made any public attempt on Tuesday to get together.

Argument over a list of 26 grievances is complicated by the fact that the UAW-CIO is seeking a union shop clause in its new contract with Briggs. Its previous contract expired Monday after unsuccessful negotiations in which the union demanded complete acquiesence to all of its grievance claims.

The strike is regarded as the most important one in the Detroit area and in the automotive business in two and a half years. Its significance is accentuated by the "union shop" demand and by general recognition of the fact that the recent UAW split has weakened the organization basically and has left the CIO faction without any funds of its own except such as it may obtain from John L. Lewis,

### 175 Tons, Wawarsing, N. Y., two bridges, Delaware Aqueduct contract 341; bids June 6.

- June v.

  175 Tons, Bridgeport, N. J., Raccoon Creek Bridge and approaches, bids close June 2.

  175 Tons, Ellinsville, N. Y., contract 341, Delaware Aqueduct; bids close June 6.
- 170 Tons, Franklin County, Pa., section 18, Pennsylvania Turnpike Commission.
  124 Tons, Pine Brook, N. J., highway project, route 6, section 11A; bids close June 9. CENTRAL AND WESTERN STATES
- 3000 Tons, San Francisco, Rincon Hill post office; general contract to George A Ful-ler Co., Los Angeles (previously reported).
- 2850 Tons, Seattle, Mud Mountain Dam; bids
- 1700 Tons, Seattle court house; M. P. Severin, Chicago, general contractor (previously reported).
- reported).

  970 Tons, Pollock, Cal.; Central Valley project (Invitation 33208-A-1); bids May 29.

  Bids opened May 2 rejected.

  950 Tons, Chicago, section S4 B, subway, new bids asked June 1. Herlihy Mid-Continent Co., Chicago, original low bidder.
- 460 Tons, Buena, Wash., Yakima project (Invitation 33868-A-1); bids May 29. Bids opened April 24 rejected.
- 400 Tons, Owensboro, Ky., river intake.
- 350 Tons, Schofield Barracks, T. H., gun battalion barracks; bids June 12.
  180 Tons, Grosse Point, Mich., pumping sta-
- 170 Tons, Holland, Mich., generator plant. 100 Tons, Chicago, Bowen High School; bids

### REINFORCING STEEL

... Awards of 10,400 tons; 10,800 tons in new projects.

- ATLANTIC STATES
  AWARDS

  Tons, Philadelphia, Glenwood Avenue
  housing project, to Bethlehem Steel Co.,
  Bethlehem, Pa., through Wark Co., con-1300 Tons.
- tractor.

  700 Tons, Bethlehem, Pa., bars for dam, to Bethlehem Steel Co., Bethlehem, Pa.

  800 Tons, Edgewater, N. J., coffee warehouse and mixing plant, Hill Brothers Coffee, Inc., to Bethlehem Steel Co., Bethlehem, Pa., through Austin Co., contractor.

  800 Tons, Niagara Falls, N. Y., carbon electrode plant for Great Lakes Carbon Corp., to Bethlehem Steel Co., through Walter Johnson Construction Co.

  800 Tons, Jersey City, N. J., Continental Can Co. plant, to Bethlehem Steel Co., Bethlem, Pa.

  414 Tons, Woodbridge, N. J., highway project.

- 444 Tons, Woodbridge, N. J., highway project, to Joseph T. Ryerson & Son, Inc., New York, through J. F. Chapman Co., Hill-side, N. J.
- 440 Tons, New Jersey, Raritan River bridge, cont. No. 4, to Bethlehem Steel Co., Beth-lehem, Pa.
- 400 Tons, Brooklyn, contract MSO-39-6, Circumferential Parkway, to Truscon Steel Co., Youngstown, through Mill Basin Asphalt Co., Brooklyn.
- 375 Tons, Buffalo, "Commodore Perry" hous-ing, to Bethlehem Steel Co., Bethlehem, Pa., through John W. Cowper Co., con-tractor.
- Tons, Queens, N. Y., contract SC-39-12, Circumferential Parkway, to Truscon Steel Co., Youngstown, through Tucka-hoe Construction Co., Tuckahoe, N. Y.
- 300 Tons, Chester, Pa., Scott Paper Co., to Concrete Steel Co., New York.
- Concrete Steel Co., New York.

  280 Tons, Brooklyn, including 80 tons mesh, contract MC-39-11, Circumferential Parkway, to Truscon Steel Co., Youngstown.

  270 Tons, Clifton, N. J., highway project, to Igoe Brothers, Newark, N. J., through Tidewater Contracting Co., Newark, N. J.

  200 Tons, Allentown, Pa., Lehigh Portland Cement Co., plant, to Bethlehem Steel Co., Bethlehem, Pa.

- 150 Tons, Buffalo, Eagle Street sewer, to Truscon Steel Co., Buffalo.
- 100 Tons. Lynn, Mass., public bid, to Truscon Steel Co., Youngstown.
  100 Tons, New York, Southern Parkway MSO-39-6, to Truscon Steel Co., Youngstown.

### CENTRAL AND WESTERN STATES

- 2100 Tons, New Orleans, housing project, to Connors Steel Co., Birmingham.
- 435 Tons, Eugene, Ore., reservoir, to Soule Steel Co., Portland, Ore., through H. J. Adler Construction Co., Yakima, Wash., contractor.
- contractor.

  332 Tons, Kingsburg, Cal., bridge, to Soule, Steel Co., San Francisco, through A. Soda & Son, Oakland, Cal., contractors.

  144 Tons, Palo Alto, Cal., hospital, to Gilmore Steel & Supply Co., San Francisco; through K. E. Parker Co., San Francisco. Previously reported to Bethlehem Steel Co., San Francisco.
- 100 Tons, Buchanan County, Va., Levisa River bridge, to Virginia Steel Co., Roanoke, Va., through Haley, Chisholm & Morris, contractors.

### PENDING REINFORCING BAR PROJECTS

### ATLANTIC STATES

- 1575 Tons, Ceredo, W. Va., flood wall.
- 600 Tons, Wyndmoor, Pa., Eastern Regional Agricultural Research laboratory.
- 550 Tons, Huntington, W. Va., housing pro-ect: Consolidated Engineering Co., low
- 399 Tons, Westmoreland County, Pa., sections 3A and 4C, Pennsylvania. Turnpike Com-mission.
- 318 Tons, Bedford County, Pa., sections 12B and 13A, Pennsylvania Turnpike Commission.
- 295 Tons, Westmoreland County, Pa., section 2, Pennsylvania Turnpike Commission.
- 290 Tons, New York, William Howard Taft school.
- 260 Tons, Hartford, Conn., N. Meadows pumping station for U. S. Engineers.
- 250 Tons, Brooklyn, grade separation, paving. 218 Tons, East Hartford, Conn., dike.
- 200 Tons. Springfield, Mass., flood control dike for U. S. Engineers.

### Navy Bids on Steel To Be Taken June 13

HE Bureau of Supplies and Accounts, Navy Department, will open bids on June 13 for 1560 tons of sheets and 413 tons of rivet bar steel for the various Navy yards.

### Society for Metals Nominates Officers

LEVELAND-Nominations for officers and directors of the American Society for Metals have been announced today by Gordon T. Williams of the Cleveland Tractor Co., chairman of the nominating com-

James P. Gill, Vanadium Alloys Co., Latrobe, Pa., was nominated for president; Dr. Oscar E. Harder, assistant director of Battelle Memorial Institute, Columbus, for vice-president, and Dr. Kent R. Van Horn of the Aluminum Co. of America, for treasurer for a term of two years. Nominees for directors include Marcus A. Grossman of Carnegie-Illinois Steel Co., Chicago, and Herbert J. French of International Nickel Co., New York. Elections will be held at the National Metal Congress in Chicago, Oct. 23.

The Standard Tube Co., Detroit, maker of welded steel tubular products and stainless steel tubing, has appointed as distributers the Union Hardware & Metal Co., Los Angeles; George F. Emanuels, 617 Western Mutual Life Building, Los Angeles, and A. E. Garnjost., 544 Market Street, San Francisco.

# Current Metal Working Activity

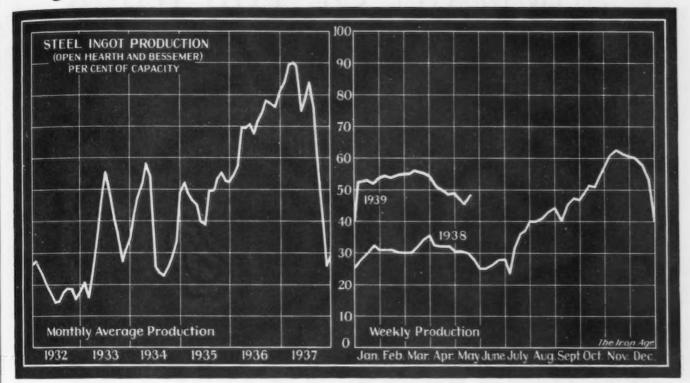
Latest Data Assembled by THE IRON AGE from Recognized Sources

					Three	Three
	April	March	February	March	Months	Months
Steel Ingots: (gross tons)	1939	1939	1939	1938	1939	1938
Monthly outputa 2,	986,985	3,396,021	2.982,011	2,004,204	9.594,685	5,435,821
	696,267	766,596	745,503	452,416	746,087	422,692
Per cent of capacity <sup>a</sup>	50.99	56.14	54.60	33.72	54.64	31.50
Pig Iron: (gross tons)						
Monthly output <sup>b</sup> 2,	056,177	2,394,615	2.060.187	1,452,487	6,630,225	4,179,840
Raw Materials:						
Coke outpute (net tons)		3,507,237	3.148,754	2,772,371	10,100,247	8,250,131
Lake Ore consumed <sup>d</sup> (gross tons) . 2,	799,769	3.316.691	2,852,540	1.980,182	9.095.937	5.679,823
Castings: (net tons)						
Malleable, orderse		35.997	33.234	20,556	107.336	57,189
Steel, orders*	*****	41,367	30,360	28,096	113,751	88,146
Finished Steel: (net tons)						
Trackwork shipments*	6,819	6,481	4,250	4,822	13,640	10,971
Fabricated shape orders!		89,530	81,298	84,257	272,160	221,721
Fabricated plate orderse		29,784	22,903	38,052	73,198	79,301
U. S. Steel Corp. shipments <sup>g</sup>	701,459	767,910	677.994	572,199	2,235.209	1.565,244
Fabricated Products:						
Automobile production <sup>b</sup>		371,940	297,841	238,753	1.023,727	669,369
Steel furniture shipmentse		\$1.8861	\$1.775	\$1.969\$	\$5,473‡	\$5,8141
Steel boiler orderse (sq. ft.)	765‡	617‡	817:	739‡	1.676‡	2.549‡
Locomotives orderedi	2,695	63	3	10	74	36
Freight cars ordered <sup>1</sup>	19	1,000	2,004	682	3,007	816
Machine tool indexi	155.6	185.4	167.1	107.0	167.81	100.4†
Foundry equipment indexk	146.0	146.6	135.3	114.6	134.9†	94.4†
Non-Ferrous Metals: (net tons, U. S. onl	y)					
Lead shipments1		40,871	34,421	31,052	115,481	96.110
Lead stocks <sup>1</sup>		122,035	122,112	143,511		
Zinc shipments <sup>m</sup>	40,641	45,291	39,723	33,528	127,758	80,556
Zinc stocks <sup>m</sup>	130,380	127,985	128,192	118,009		
Tin deliveries <sup>n</sup> (gross tons)	5,980	4,755	4,105	4,555	13,190	14,525
Refined copper deliverieso	46,667	55,025	51,377	44,576	161,429	107,563
Refined copper stocks <sup>o</sup>	332,513	320,812	309,119	342,785		
Exports: (gross tons)						
Total iron and steelp		474,360	359,690	526,883	1.196,722	1.573,767
All rolled and finished steel <sup>p</sup>		145,164	110,766	130,888	363,482	391,762
Semi-finished steelp		9,485	14,472	30,021	39,399	101,559
Scrap		310,223	222,704	334,742	758.361	946,150
Imports: (gross tons)						
Total iron and steel		25,369	19,149	11,827	72,182	61,047
Pig iron <sup>p</sup>		3,658	603	746	4,847	13,847
All rolled and finished steel®		14.102	10,738	8,522	42,866	40,478
British Production: (gross tons)						
Pig iron <sup>q</sup>	608,900	603,600	516,000	714,600	1,620,100	2,169,000

<sup>†</sup> Three months' average. ‡000 omitted. Preliminary.

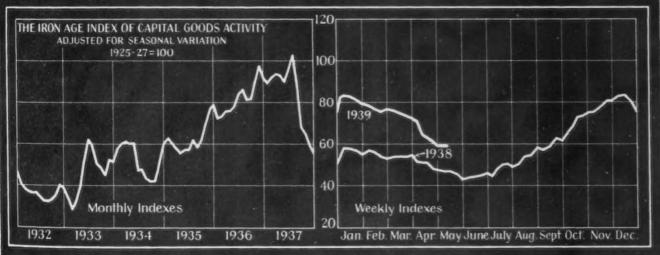
Source of data: American Iron and Steel Institute; The Iron Age; Bureau of Mines; Lake Superior Iron Ore Association; Bureau of the Census; American Institute of Steel Construction; United States Steel Corp.; Preliminary figures from Ward's Automotive Reports—Final figures from Bureau of the Census, U. S. and Canada; Association; National Machine Tool Builders Association; Foundry Equipment Manufacturers Association; Machine Tool Builders Association; Institute; New York Commodity Exchange: Copper Institute: Department of Commerce: British Iron and Steel Federation.

# Ingot Production Jumps Two and a Half Points to 48%



Detroit Southern Western St. Louis ern Chicago Valleys delphia District Ingot CURRENT WEEK. 36.0
Per PREVIOUS WEEK. 34.0 43.0 60.0 41.0 50.0 48.0 49.0 43.0 33.0 53.0 41.5 56.0 55.0 46.5 34.0 55.0 46.5 45.5 60.0 46.0

# Index Moves Higher for First Time in II Weeks



THE downward trend of The Iron Age index of capital goods activity reversed itself in the past week and moved up 0.3 point to 59.4. While this gain, the first in 11 weeks, was relatively small, it nevertheless does serve to substantiate the belief that the index has passed the low point of the current movement. With the coal strike settled, another factor that has exerted a strong depressing influence on the index will be removed and this should serve to assist the upward movement materially. A large portion of the past week's advance was due to the unexpected increase in automobile assemblies. Lumber carloadings continue to move slowly upward as spring home construction and repairing gathers momentum. The dollar volume of heavy construction improved slightly during the

week, but the gain was less than the seasonal trend, causing a slight decline in the adjusted index figure of this factor.

	Week Ended May 20	Week Ended	Comparable Week		
		May 13	1938	1929	
Steel ingot production <sup>1</sup> Automobile production <sup>2</sup> Construction contracts <sup>3</sup> Forest products carloadings <sup>4</sup> . Production a n d shipments.	74.0 54.0	59.9 60.5 74.1 53.2	37.2 40.1 61.8 46.7	129.0 128.9 126.1 122.8	
Pittsburgh District <sup>6</sup>		47.8	46.9	124.7	
Combined index	59.4	59.1	46.5	126.3	

Sources: 1. The Iron Age; 2. Ward's Automotive Reports; 3. Engineering News-Record; 4. Association of American Railroads; 5. University of Pittsburgh.

# SUMMARY OF THE WEEK

... Ingot production rises with ending of anxiety over coal.

... Heavy bookings of sheet and strip also a factor.

...Blast furnaces resume and scrap prices strengthen in some areas.

S a result of the settlement of the coal situation and the heavy bookings of sheets and strip at reduced prices during the past two weeks, steel operations have gained in some districts, bringing the rate for the industry as a whole to 48 per cent, a gain of two and a half points over last week.

There has been a resumption of activity at several blast furnaces that were banked during the coal tie-up accompanied by higher operations of by-product coke ovens.

The anxiety over coal supplies was ended with the signing of agreements between the steel companies which own coal mines and the United Mine Workers on terms identical with those existing in previous contracts, the "union shop" clause which prevailed in contracts with commercial mine owners having been omitted.

While the freer supply of coal has been the main influence in higher operations this week, the receipt of specifications against sheet and strip commitments has played a part and will be increasingly important in sustaining or increasing the rate of steel production during the next few months.

ATTEMPTS to estimate the amount of tonnage that was booked during the recent "bargain days" are made difficult by the fact that many buyers made commitments with more than one mill, but it is generally admitted in the trade that bookings were nearly as large as those of last fall, and in the case of automobile manufacturers they may have been larger. In the six months ended March 31, total production of all grades of sheets was 3,466,211 gross tons, much of which was bought at the low prices which prevailed for a brief period last October. The extent of the bulge in sheet production in that half-year period is shown by the fact that the total output was about 81 per cent greater than that of the 1,911,682 tons turned out in the preceding six months.

The aftermath of the price debacle is bitter chagrin among the steel companies that two such periods of unbridled competition should have occurred in about the same manner within eight months and that the return from large expendi-

tures in continuous mills should not even pay the actual cost of rolling the steel let alone return on the investment. In this picture also is the critical position of non-integrated sheet mills which are obliged to pay about as much for semi-finished steel as they have recently obtained for their finished product.

During the past week the mills have been winding up the transactions that took place during the buying wave and have apparently closed the door to further concessions. Some mills are insisting that specifications against low-priced commitments shall be in their hands not later than June 30 for rolling at mill convenience, and in at least one instance Oct. 31 has been set as a deadline for shipments against the tonnage taken. If these restrictions are adhered to, rolling of sheets and strip will be fairly heavy during the entire third quarter as many consumers and distributers who do not need the steel now (the automobile industry for example) will delay specifications as long as possible.

Following the announcement of new prices on hot rolled carbon and alloy bars, the makers of cold finished bars have reduced the base quotations \$1 a ton, but have revised quantity deductions so that the net price to large buyers is unchanged. Bolt and nut makers, who are large users of bars, have not announced prices for the third quarter but are expected to do so shortly. Pig iron prices for the third quarter are likely to remain unchanged.

AS business stands now with the steel companies, they have large bookings of sheets and strip, fair bookings of tin plate, structural steel, reinforcing bars and some unshipped tonnage of rails and track accessories, and a moderate amount of pipe business. Wire products, and merchant bars are slow, but it is expected that bar orders will gain before the end of June as large buyers will get the benefit of a \$1 a ton lower price on this quarter's purchases owing to the change in the base price and the elimination of quantity deductions.

Fabricated structural steel lettings this week are low at less than 13,000 tons, but new projects out for bids call for more than 20,000 tons. Reinforcing steel awards are upward of 10,000 tons and new projects are close to 11,000 tons.

A strike at the Briggs plants in the Detroit district, which has forced 70,000 automobile workers into idleness, will curtail assemblies this week, but in any event car production would have been greatly reduced next week owing to holiday shutdowns in several plants.

SCRAP prices have strengthened 50c. a ton at Youngstown and 25c. at Cleveland, but are unchanged in the centers that are included in THE IRON AGE scrap composite price, which remains at \$14.08.

# A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous Advances Over Past Week in Heavy Type, Declines in Italics

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Rails and Semi-finished Steel		35 10	A 9F	May 94	Cents Per Lb.: 1939	May 16, 1939	Apr. 25, 1939	May 24, *1938
Per Gross Ton:	1939	1939	1939	May 24, *1938	Wire nails: Pittsburgh, Chi- cago, Cleveland, Birming-			
Rails, heavy, at mill	\$40.00	\$40.00	\$40.00	\$42.50	Plain wire: Pittsburgh, Chi-	2,45	2.45	2.75
cago, Birmingham	40.00	40.00	40.00	43.00	cago, Cleveland, Birming- ham	2.60	2.60	2.90
Chicago, Gary, Cleveland, Youngstown, Buffalo, Bir- mingham, Sparrows Point.	34.00	34,00	34.00	37.00	burgh, Chicago, Cleveland, Birmingham †3.30	3.30	3.30	3.40
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngs-	01.00	01.00	01.00	01100	Tin plate, 100 lb. base box: Pittsburgh and Gary \$5.00	\$5.00	\$5.00	185.35
town, Buffalo, Canton, Spar- rows Point	34.00	34.00	34.00	37.00	*Pittsburgh prices only, †Applies to 80-rod spools only, †Subject to post-season adjustment,			
town, Buffalo, Birmingham, Sparrows Point Forging billets: Pittsburgh, Chicago, Gary, Cleveland,	34.00	34.00	34,00	37.00	Pig Iron			
Youngstown, Buffalo, Bir-	10.00	10.00	10.00	40.00	Per Gross Ton: No. 2 fdy., Philadelphia\$22.84	\$22.84	299 04	895 04
mingham Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleve-	40.00	40.00	40.00	43.00	No. 2, Valley furnace 21.00 No. 2, Southern Cin'ti 21.06	21.00 21.06	\$22.84 21.00 21.06	\$25.84 24.00 23.89
land Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown,	43.00	43.00	43.00	47.00	No. 2, Birmingham         17.38           No. 2, foundry, Chicago†         21.00           Basic, del'd eastern Pa.         22.34           Basic, Valley furnace         20.50	17.38 21.00 22.34 20.50	17.38 21.00 22.34 20.50	20.38 24.00 25.34 23.50
Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	2.10	Malleable, Chicago† 21.00 Malleable, Valley	21.00 21.00 28.34	21.00 21.00 28.34	24.00 24.00 30.34
Finished Steel					Ferromanganese, seab'd car- lots	80.00	80.00	102.50
Cents Per Lb.:					†The switching charge for delivery	to four	dries in	the Chi-
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo,					cago district is 60c. per ton.	10 1041	Miles III	,
Birmingham Plates: Pittsburgh, Chicago, Gary, Birmingham, Spar-	2.15	2.15	2.25	2.45	Scrap			
rows Point, Cleveland, Youngstown, Coatesville,					Per Gross Ton: Heavy melting steel, P'gh\$14.25	\$14.25	\$14.75	\$11.00
Claymont Structural shapes: Pittsburgh,	2.10	2.10	2.10	2.25	Heavy melting steel, Phila 15.25 Heavy melting steel, Ch'go 12.75	15.25 12.75	15.50 12.75	12.00 10.75
Chicago, Gary, Buffalo, Bethlehem, Birmingham Cold finished. bars: Pitts-	2.10	2.10	2.10	2.25	Carwheels, Chicago 12.50 Carwheels, Philadelphia 16.00 No. 1 cast, Pittsburgh 15.25	12.50 16.00 15.25	12.50 16.25 15.25	12.50 14.75 13.25
burgh, Buffalo, Cleveland, Chicago, Gary	2.70	2.70	2.70	2.90	No. 1 cast, Philadelphia 16.25 No. 1 cast, Ch'go (net ton) 11.75	16.25 $11.75$	16.75 11.75	14.25 10.75
cago, Buffalo, Bethlehem, Massillon or Canton	2.70	0.70	0.00	2.00	C-1 - C1 :#			
Hot rolled strip: Pittsburgh.		2.70	2.80	3.00	Coke, Connelsville			
Chicago, Gary, Cleveland, Middletown, Youngstown,					Per Net Ton at Oven: Furnace coke, prompt \$3.75	\$3.75	\$3.75	\$4.00
Birmingham Cold rolled strip: Pittsburgh,	2.00	2.00	2.15	2.30	Foundry coke, prompt 4.75	4.75	4.75	5.00
Cleveland, Youngstown Sheets, galv., No. 24: Pitts- burgh, Gary, Sparrows Point, Buffalo, Middletown,	2.80	2.80	2.95	3.10	Non-Ferrous Metals			
Point Buffalo Middletown					Cents per Lb. to Large Buyers:			
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo,	3.50	3,30	3.50	3.80	Copper, electrolytic, Conn 10.00 Copper, lake, New York 10.00 Tin (Straits), New York 48.70 Zinc, East St. Louis 4.50	10.00 10.00 48.87		$9.00 \\ 9.125 \\ 37.25$
Sparrows Point, Cleveland, Youngstown, Middletown Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown,		2.00	2.15	0 0 0	Zinc, New York 4.80 Lead, St. Louis 4.60 Lead, New York 4.75	4.50 4.80 4.60 4.75	4.50 4.89 4.60 4.75	4.00 4.39 4.10 4.25
Cleveland, Middletown	3.05	3.05	3.20		Antimony (Asiatic), N. Y 14.00	14.00	14.00	14.25

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

# The Iron Age Composite Prices

	Finished	Steel	Pig	Iron		Scrap	
May 23, 1939 One week ago One month ago One year ago	week ago 2.236			.61 a Gross Ton .61 .61 .25	\$14.08 a Gross Ton 14.08 14.33 11.25		
	Based on stee tank plates, wir pipe, sheets and b These products re cent of the United	e, rails, black not-rolled strip. epresent 85 per	Based on ave iron at Valley fu dry iron at Ch phia, Buffalo, Va ern iron at Cinc	icago, Philadel- alley and South-		. 1 heavy melting is at Pittsburgh, nd Chicago.	
	Нісн	Low	HIGH	Low	Нісн	Low	
1939 1938 1937 1936 1934 1933 1932 1931 1930 1929 1928	2.118c., Apr. 24; 1 1.953c., Oct. 3; 1 1.915c., Sept. 6; 1 1.981c., Jan. 13; 1	2.211c., Oct. 18 2.249c., Jan. 4 1.016c., Mar. 10 2.056c., Jan. 8 1.795c., May 2 1.792c., May 2 1.870c., Mar. 15 1.883c., Dec. 29 1.952c., Dec. 9 2.1952c., Oct. 29	\$23.25, June 21; 23.25, Mar. 9; 19.73, Nov. 24; 18.84, Nov. 5; 17.90, May 1; 16.90, Dec. 5; 14.81, Jan. 5; 15.90, Jan. 6; 18.21, Jan. 7; 18.71, May 14; 18.59, Nov. 27;	20.25, Feb. 16 18.73, Aug. 11 17.83, May 14 16.90, Jan. 27 13.56, Jan. 3 13.56, Dec. 6 14.79, Dec. 15 15.90, Dec. 16	\$15.29, Mar. 28 15.00, Nov. 22 1.92, Mar. 30 17.75, Dec. 21 13.42, Dec. 10 13.00, Mar. 13 12.25, Aug. 8 8.50, Jan. 12 11.33, Jan. 6 15.00, Feb. 18 17.58, Jan. 29 16.50, Dec. 31	12.92, Nov. 10 12.67, June 9 10.33, Apr. 29 9.50, Sept. 25 6.75, Jan. 3 6.43, July 5 8.50, Dec. 29 11.25, Dec. 3	

# THIS WEEK'S MARKET NEWS

### **PRICES**

. . . Cold finished bar quotations and deductions revised

M AKERS of cold finished carbon and alloy bars have reduced the base price \$1 a ton and have made some changes and eliminations in the quantity discount set-up. The wild fire price cutting has apparently burned itself out and last week final "mopping up" on previous commitments took place. As indicated last week, practically all customers of any consequence had their chance to cover their future requirements at the low prices, and deliveries in many cases are expected to extend over a considerable length of time.

Some confusion still exists in the hot rolled bar market but this is probably due to the recent change when the base price was reduced \$2 a ton, which in reality made \$1 advance for large buyers who had been getting a \$3 quantity allowance. This allowance was eliminated at the time of the price change, but it is understood that large bar buyers are being covered for the remainder of this quarter.

Warehouses have revised their schedules.

No announcements had been made up to Tuesday on pig iron and bolts, nuts and rivets.

Because of heavy bookings of cheap sheets and strip, most CHICAGO sales offices report order books far ahead of a month ago. Revised opinions give rise to some doubt as to the accuracy of last week's statement that CHICAGO district sales at the low prices exceeded those of last October. No local mill has made a thorough survey to determine the answer to this question, but now that thinking on the subject is calmer, some believe perhaps their original estimate have been too strong. All agree a considerable tonnage was placed in that territory and that it probably will be months before a satisfactory comparison is possible.

New bids are being taken June 1 on a section of the Chicago subway, Herlihy Mid-Continent Co., Chicago, having been the original low bidder. About 1200 tons of liner plates and 950 tons of reinforcing bars are involved.

A fairly active period for the con-

struction industry is being reflected in better showings for reinforcing bars and pipe. Since much of the building in the CHICAGO territory consists of small commercial or residential projects, structural shapes are not enjoying a similar demand. Activity this spring in household equipment has benefited many CHICAGO district producers. Illustrative of this trend, is the recent report of the American Washer and Ironer Manufacturers' Association. which shows April shipments of washing machines 22 per cent above those of a year ago, and ironer shipments 27 per cent better than in April, 1938.

### STEEL OPERATIONS

... Ingot rate for industry moves up 2½ points to 48%

WITH the settlement of the coal tie-up and larger bookings of sheets and strip, some of the steel companies have boosted operations this week not only in steel-making departments but in blast furnace and coke oven departments as well. The rate for the industry is estimated at 48 per cent for this week, up two and a half points from last week.

Gains have been made in the PITTS-BURGH, CHICAGO, CLEVELAND-LORAIN, WHEELING-WEIRTON and BUFFALO districts, with losses only in the Youngstown and Southern Ohio districts. There was a gain of two points to 36 per cent at PITTSBURGH, one of three and a half points to 49 per cent at CHICAGO, one of six points to 53 per cent in the CLEVELAND-LORAIN area, also six points to 56 per cent in the WHEELING-WEIRTON district and the BUFFALO gain amounted to seven and a half points to 41½ per cent.

Some of the advance is due to the clearing up of the coal situation and some to the receipt of specifications against recent low-priced commitments for sheets and strip. There has been a resumption of blast furnace activity in some districts, two having gone on in the Chicago area, and coke ovens have also stepped up their activity.

With the elimination of the coal shortage threat in the steel industry, Carnegie-Illinois Steel Corp. in the past week has blown in four blast furnaces which had been banked as a coal

conservation measure. Some other steel companies which had cut pig iron production on furnaces retained in operation are expected to increase their output now that there is no further need for conserving coal supplies.

### NEW BUSINESS

... Gains recorded in some products other than sheets and strip

TOTAL bookings in the past week at PITTSBURGH have expanded slightly owing to increased specifications in sheets, strip and structural products. Order books are expected to be swelled materially in the near future when specifications and release against low-priced commitments begin rolling in.

Excluding the recent abnormal demand for sheets and strip, aggregate incoming orders at CLEVELAND and Youngstown during May are showing gains compared with April. Varying increases are reported for virtually all items except merchant wire products and rods. Tubular goods sales for one mill have been assisted by a 55mile pipe line from the Aranac field to Midland, Mich. The proportion of sheet and strip tonnage slated for immediate shipment is small in comparison to total recent bookings, indicating that deliveries will be extended well into the future.

### PIG IRON

... Unchanged prices expected for the third quarter

MERCHANT producers of pig iron have made no announcements regarding third quarter prices, but it is the general belief in the trade that there will be no change. Price announcements are expected around June 1.

The reaffirmation on Monday of the present charcoal iron price of \$25 per ton, furnace, for third quarter business, substantiates the feeling that all present pig iron prices will be extended through the third quarter.

Buying is very light in all sections of the country. Shipments are running fairly close to those of April, but where there is a difference it is more

likely to be a decrease rather than an increase.

Foundry operations are not showing improvement.

A small cargo of pig iron left Port Richmond, near Philadelphia, last week on an old export order. New foreign inquiry asks for such low prices that domestic furnaces are not much interested. However, several thousand tons is reported to have been sold by a Great Lakes furnace for direct shipment abroad by an oceangoing freighter.

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# IRON ORE

... Consumption reduced sharply in April

WITH the number of active furnaces drastically reduced during April, iron ore consumption during the month totaled 2,799,769 gross tons against March consumption of 3,316,691 tons and April, 1938, consumption of 1,853,658 tons. At the end of April only 80 furnaces using Lake Superior iron ore were in blast against 97 at the end of March, according to Lake Superior Iron Ore Association, Cleveland.

On hand May 1 at docks and furnaces were 22,790,933 tons compared with 25,872,124 tons in stock April 1 and 33,676,333 tons May 1, 1938.

# SHEETS AND STRIP

... Buying wave at reduced prices leaves problems in its wake

THE splurge of buying of sheets and strip at reduced prices during the past two weeks has left in its wake a number of problems for the steel companies.

Chief among these is the question of setting a deadline on specifications against low-priced commitments. When the price break began the steel companies insisted on immediate specifications, but in the case of many large customers it was seen that this was impractical; hence a more lenient position was taken. However, some companies are now insisting that all specifications be filed with the mill not later than June 30 for rolling at the mill's convenience. One CHICAGO company has set an Oct. 1 deadline on shipments, all rollings after July 1 to be at the mill's convenience. In any event, it is admitted that shipments against recent bookings will extend well

through the third quarter. In the case of the automobile companies, it is the general belief that the sheets and strip they will take in during the next several months will provide for production of 1940 models at least until the end of the calendar year.

Another problem has been created by the fact that bookings have been taken, in some instances from one company, at different prices. This was due to the rapidity of the drop in prices, which started at \$4, spread to \$6 within a day or two and wound up at \$8 for some of the larger buyers. Customers who committed themselves at \$4 or \$6 off the published prices have in many instances asked for the maximum of \$8. Quite a few are said to have been refused this further concession.

Attempts to estimate the total amount of steel placed with the mills at the lower prices are made difficult by the fact that some customers covered with several mills. In DETROIT it is stated that the coverage by automobile companies was probably greater than that of last fall, but this situation is not believed to prevail generally throughout the country as there were some areas much less affected by the "bargain days" than others. In this connection it is of interest that the total production of all grades of sheets in the fourth quarter of last year and the first quarter of this year, as reported by the American Iron and Steel Institute, was 3,466,211 gross tons. A large part of this tonnage is believed to have been bought at last fall's low prices. Even if the recent buying was in smaller total volume than that of last fall, it is conceded to be a fairly substantial amount. This leaves the further problem for the steel industry of anticipating what may happen with regard to prices when present commitments have run out. Twice within eight months these price-cutting splurges have occurred, presenting a disorderly method of marketing which will undoubtedly engage the attention of the trade in an effort to establish better merchandising policies.

Specifications for sheets and strip have increased sufficiently as a result of the heavy buying to lift operating rates at some mills. After a final week of "mopping up," during which commitments were either withdrawn or negotiated formally, the market has settled back to published prices which will remain untested for a considerable length of time owing to the absence of large tonnages.

During the price cutting wave con-

cessions of \$3 to \$6 a ton were made on galvanized sheets, but the price on this product is back this week to 3.50c. a lb., but will remain untested for a time as the coverages were substantial. The same situation exists with respect to galvanized formed roofing and siding.

# STRUCTURAL STEEL

. . . Brooklyn Shore viaduct to require 6000 tons

FOR the first time in several weeks, an increase in inquiries involving privately financed structural projects has occurred, and Highway projects are more active in the South and Central states.

New projects include 6000 tons for the Shore Road parkway viaduct, Brooklyn, 2500 tons for a nurses' home at Jersey City, N. J., and 1500 tons for six highway bridges at Oklahoma City, Okla. The city of PITTS-BURGH is taking bids for an incinerator plant requiring 800 tons.

Contracts awarded include 1210 tons to the Pittsburgh-Des Moines Steel Co., Des Moines, Iowa, for a Navy yard shop at Portsmouth, N. H., and 1900 tons for the state college field house at East Lansing, Mich., to R. C. Mahon Co., Detroit. Buffalo Structural Steel Co. will supply 800 tons of shapes for the new Kleinhans Music Hall. Buffalo.

## RAILROAD BUYING

... Lehigh Valley may buy 500 cars from Bethlehem

THE Lehigh Valley railroad has asked ICC authority to enter into a contract or conditional sales agreement with the Bethlehem Steel Co. for the construction by the latter at its Johnstown, Pa., plant of 500 50-ton double hopper steel coal cars, at a cost of \$1,125,000, with an interest rate of 4 per cent, payment to be made at a rate of 70c. per car per day plus interest over a period of 11 years.

The Birmingham Southern has placed an order for 100 hopper cars and 10 flat cars with Pullman Standard Car Mfg. Co. Akron, Canton & Youngstown is seeking bids on two 2-8-2 type locomotives.

Equipment, materials and fuel purchased by the Class I railroads during the first three months of 1939 totaled approximately \$217,000,000, as compared with \$162,217,000 in the first

quarter of 1938—an increase of approximately \$54,783,000, or 34 per cent—according to figures compiled by the *Railway Age* from special reports received from the carriers.

"The quarterly total included \$119,-424,000 of materials, exclusive of fuel, received from manufacturers," the Railway Age says, "as compared with \$89,850,000 in the corresponding period of 1938-an increase of \$29,574,-000, or 33 per cent. Orders for new locomotives and cars from builders totaled approximately \$20,680,000, as compared with \$9,537,000 in the first three months of 1938, making the total purchases of materials and equipment from manufacturers \$140,104,000, as compared with \$99,387,000 in the first quarter of 1938-an increase of \$40,-717,000, or 41 per cent.'

# MERCHANT BARS

. . . Price change has brought no increase in orders

ORDER books at PITTSBURGH have not yet felt the effect of recent price changes, but some sources continue to expect a mild amount of forward buying before the end of this quarter. Total specifications last week were at a slightly lower level than in the previous week. A fairly representative miscellaneous demand persists, although individual tonnages remain small.

In the CLEVELAND and YOUNGSTOWN districts only moderate coverage has been noted coming from large consumers. Mills are accepting orders currently at whatever basis brings consumers the lowest price, prior to effective date of the quantity allowance abandonment. One effect of the recent quantity deduction elimination will be to place at a further disadvantage large buyers of hot rolled bars who do cold drawing. The spread between hot rolled carbon bars and cold finished bars is now \$10 a ton, increased by \$1 per ton, without consideration of extras.

Bookings of bars in the CHICAGO district are running a little behind those of a month ago but are still in fairly good volume. The chief buyers, as has been the case for the past month or two, are makers of tractors and the jobbers. Automobile plants and manufacturers of automobile parts are not yet in the market in a serious way for 1940 model requirements, but this business probably will materialize in four to six weeks.

# WIRE PRODUCTS

... New business barely holding to recent level

THE volume of both manufacturers' wire and merchant wire products specifications is hardly holding its own with previous levels at PITTSBURGH. Part of the lethargy is attributed to seasonal influences. Although no important step-up in the amount of new business is looked for in the near future, producers do not expect a sharp decline.

At CLEVELAND manufacturers' wire is a little more prominent among incoming orders, while buying of merchant products is tapering. Wire rods continue quiet. Producers have encountered inquiries concerning the possibility of a price revision, probably aroused by the change on merchant bars, but rod prices have already been reaffirmed for third quarter. Export demand so far this month has proved considerably better than during April.

An improvement over April has been shown this month in CHICAGO district bookings of merchant wire products, while industrial wire demand has remained constant. An increase in the latter will be seen when motor car makers become active on 1940 models, as a number of parts makers and other suppliers are located in this vicinity.

# PLATES

. . . Little business offered in test of prices

DURING the recent break in prices of sheets and strip the plate market, particularly in the East, underwent considerable pressure. Concessions of \$2 or \$3 a ton have been available to some buyers on certain types of plates, such as narrow material and lighter gages in tank quality, but special quality plates have been held fairly well at the Eastern mill base price of 2.10c. a lb. There has been a fair amount of inquiry for export, prices quoted ranging from 1.67c. to 1.70c. f.a.s.

Although some railroad shops have resumed work following the settlement of the coal strike, requisitions for plates have not developed as yet. Shipbuilding is one of the mainstays of current plate rollings, but not all plate mills are sharing in this business.

Among the larger tonnages that will be up for bids shortly are another section of an intake line at Toledo, Ohio; a standpipe of 1,145,000-gal. capacity for Warren, Ohio, and 1200 tons for Mud Mountain Dam, near Seattle, Wash. The Chicago Bridge & Iron Co, booked 1200 tons for a pipe line at Elwood, Neb.

Miscellaneous demand is about all that exists in the CHICAGO market. Some railroad business is in prospect, but it is not known definitely when this will develop. About 1200 tons of liner plates will be required for a section of the subway, new bids on which will be taken June 1.

# WAREHOUSE BUSINESS

. . . Jobbers revising prices to conform to mill changes

CLEVELAND warehouses, following the lead of distributers in other cities, early this week announced price reductions on hot rolled and cold finished bars, sheets, strip, plates, structurals and alloy steel.

Warehouse prices in New York were revised Monday to conform to the new mill price set-up. Buying in that area has been consistently dull since the first rumors of softness in mill prices, but now that quotations appear to be on firmer ground a resumption of buying on a larger scale is expected.

warehouse steel prices, Detroit which have been jittery since early last fall, underwent revision this week with lower prices on almost every item, effective Tuesday, May 23. All warehouses in the city fell in line and made the downward revisions. Carbon bars and bar shapes were down 10c. per 100 lb. Plates and structural, hot rolled strip and sheets, cold rolled sheets and floor plates were each down 15c. Cold rolled alloys (2300 series) were down 10c. and hot rolled alloy steel (SAE 3100) down 20c. Carbon cold finished bars were down 5c. per 100 lb. last week. Galvanized sheets are in an unsettled position, being 15c. off in the city and entirely on a competitive price basis outside the city where other markets also are attempting to supply. Warehouse men claim that they can still get coverage from the mills at the prices they were getting one and two weeks ago and even during the winter and early spring. These concessions, of course, are not as large as those granted recently to automotive manufacturers. Warehousemen say that the mills are insisting on immediate delivery on these items when the order is signed but are

not enforcing this requirement. Some of them claim to have bought recently for second and third quarter delivery on this basis. The price of cold rolled strip has not changed yet in Detroit but probably will follow the action taken in Chicago.

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from geteven oring. e not eently Varee inthese PITTSBURGH warehouse base prices have been reduced \$5 a ton on hot rolled bars, \$3 a ton on plates, structural shapes and hot rolled sheets and strip while cold finished carbon bars have been reduced \$1 a ton. A large portion of this reduction is recognition of weak prices during the last several weeks.

# COLD FINISHED BARS

... Base price reduced \$1, quantity deductions revised

ASE price on cold finished carbon BASE price on cold and base bars, f.o.b. Pittsburgh, has been reduced \$1 a ton to 2.65c. a lb., effective May 17. The quantity extra on less than 300 lb. has been advanced 50c. a ton to \$3. Quantity deductions have been revised with a maximum discount of \$2 a ton applying on orders involving 20 tons or more of one size, shape and grade for shipment at one time. A deduction of \$1 a ton is allowed on shipments of under 20 to 10 tons, while the base price applies on business involving under 10 to five tons. The result of this revision makes the net price to large buyers unchanged, as they previously obtained a \$3 quantity discount on business involving 75 tons or more for shipment at one time, but smaller buyers will benefit from the change. Base price on alloy cold finished bars has been reduced \$1 a ton, making it 3.35c. a lb., f.o.b. Pittsburgh. . Quantity extras remain the same but quantity deductions have been revised and are identical with the new ones on cold finished carbon bars shown above.

#### SEMI-FINISHED STEEL

... Better movement of sheet and tin bars expected

TOTAL bookings at PITTSBURGH declined a shade last week but future business is expected to increase. The improvement will undoubtedly come from greater activity at non-integrated sheet and tin plate plants.

Sheet bars have been moving better at CLEVELAND. Other items show very little change from the reduced activity prevalent during the past month.

# TUBULAR GOODS

. . . Pipe sales holding at last month's level

TOTAL tubular goods specifications so far this month at PITTS-BURGH are practically on a par with the volume in the same period last month. Little or no pick-up is expected until releases from oil companies are somewhat better than they have been recently. Prices on merchant pipe continue erratic in some secondary markets.

# REINFORCING BARS

. . . Awards sag but new projects are more numerous

A 2100-ton housing project award in New Orleans going to Connors Steel Co., BIRMINGHAM, stood out this week in a continued dull market. Except for 1300 tons for a Philadelphia housing job, taken by Bethlehem Steel Co., there were no other awards above 1000 tons.

New inquiries the past week were led by 3000 tons for the San Francisco post office, 2850 tons for the Mud Mountain dam, Seattle, and 1575 tons for a flood wall at Ceredo, W. Va. Various districts see prospect of improvement in demand for bars. In CHICAGO, for instance, half a dozen jobs are expected to break within the next 10 days, and new bids will be taken June 1 on 950 tons of bars for a section of the subway.

# **BOLTS, NUTS AND RIVETS**

. . . Announcement of third quarter prices expected soon

THE volume shows very little improvement and is particularly dull in the heavier items. Principal interest attaches to estimating and figuring on automotive contracts for 1940 models. Announcement of third quarter bolt, nut and rivet prices is expected before long. Current published prices have undergone shading in various areas this quarter. Considerable confusion surrounds the recently announced revision of hot rolled carbon bar prices whereby large users would theoretically pay \$1 more per ton. Currently steel mills are accepting bar business on whatever basis which gives consumers the lowest price.

# TIN PLATE

... Operations steady at 70% ... Export business good

IN plate operations are again unchanged this week at 70 per cent. Releases have been slightly more numerous in the past week and this upward trend is expected to continue over the next several weeks. Export business has been holding up well, but there is some evidence that this season's domestic volume of tin plate releases will fall slightly short of producers' expectations. Although the sardine pack did not materialize last year, a fair packing season is indicated for this year and the trade will benefit to the extent that can makers have not carried over supplies.

# Weekly Bookings of Construction Steel

	Week Ended			Year to Date		
	May 23, 1939	May 16, 1939	Apr. 25, 1938	May 24, 1938	1939	1938
Fabricated structural steel awards	12,850	10,350	19,200	12,200	402,460	272,175
Fabricated plate awards	2,020	880	505	635	70,395	52,305
Steel sheet piling awards	0	665	0	3,700	22,005	12,450
Reinforcing bar awards	10,400	8,800	4,900	5,325	199,795	93,410
Total Letting of Construction Steel	25.270	20.695	24,605	21,860	694,655	430,340

# IRON AND STEEL SCRAP

. . . Youngstown and Cleveland prices are higher, but composite is unchanged at \$14.08.

AY 23-No. 1 steel and allied grades are up 50c. a ton at Youngstown and 25c. at Cleveland on the basis of small sales into consumption as a result of improvement in open-hearth operations. Otherwise most markets are extremely quiet and unchanged, although the tone is stronger at Pittsburgh, Buffalo prices are off 50c. sentimentally, but the market has had no real test there. There has been some activity in No. 2 steel at St. Louis, one mill buying at \$1 less than on the previous purchase. Dealer buying prices, anticipating the trend, had already reflected the lower price level, which remains unchanged this week. Generally, the feeling is that scrap prices have reached bottom and are likely to follow a rising rate of open-hearth operations.

Shipments of scrap abroad are going forward at an accelerated pace, and export buying prices are firm but unchanged since the supply seems adequate to meet the increased demand.

#### Pittsburgh

The market is slightly stronger than week ago. One consumer who had been attempting to obtain No. 1 heavy melting steel at \$14 a ton purchased a small tonnage in the past week at \$14.50. Although brokers taking this order have been able to pick up odd cars occasionally at \$14, some have paid \$14.25 a ton. Other consuming points in the district in the past week continue to pay equivalent to \$14.50 a ton for No. 1 although no large transactions have taken place. Most brokers and even some consumers are of the opinion that for the time being at least the bottom of the market has been reached. Although the market is showing some signs of strength, No. 1 heavy melting steel is quotably un-changed this week at \$14 to \$14.50 pending representative buys at higher

#### Chicago

The scrap market here is exceptionally quiet. Mill operations are looking up, probably because of the tonnage placed at low prices two weeks ago but a substantial rise is not expected. Brokers continue to buy heavy melting steel at \$12.50 to \$12.75 with only a minor portion being purchased at the lower figure. No important railroad lists have come out in the past week.

#### Philadelphia

The market here continues its listless course, with the price list unaltered from last week. Quoted price levels on important grades represent current activity, but foundry grades and specialties in frequent instances are comparatively indefinite because of lack of testing. Shipments of a very spotty nature are going into all district mills, but significant activity domestically is not expected for some weeks to come. On the other hand, export loadings continue quite active. An 8000-ton boat is loading now, another boat will pick up 2700 tons about May 27, and a third boat is expected June 1 to load 8000 tons. Buying prices are unchanged from last week.

#### Youngstown

The market is quoted up 50c. per ton this week on the basis of recently placed orders, and may be a trifle too low even at the higher figures. Most mills are taking in scrap at a better rate than two weeks ago. Open-hearth operations have improved at Warren, where as orders run out additional business is being placed with dealers.

#### Cleveland

Sale of a limited tonnage of openhearth grades here during the past week, combined with slightly better steel works operations, has firmed up the local market. No. 1 heavy melting steel and allied grades are quoted up 25c. per ton. Principal out-of-town movement continues toward the Valley. With the Cuyahoga River dredging virtually completed, the Lake vessel movement to this city is expected to gain headway.

#### Buffalo

About 5000 tons of No. 1 heavy melting steel is due to arrive at Buffalo by water within the next few days. The shipment was made on old orders. Although the market is quiet and no sales are reported this week, No. 1 and No. 2 steel are down 50c, along with the customary differential in the allied grades. In a slack market borings and turnings in addition to the foundry specialties have also dropped off 50c, and \$1. In the May 11 issue a price drop of 50c, in No. 2 bundles was not recorded on the list. Present price is \$10 to \$10.50.

#### St. Louis

Two East Side mills have entered the market for round tonnages of scrap this week. One mill took from 3000 to 4000 tons of No. 2 heavy melting steel, paying \$11.50 per ton, which represented a decrease of \$1 a ton from the last previous buy of the same grade. Tonnage involved in the other purchase has not been divulged. On the quantity announced, delivery will be over the next 30 days. Offerings from all quarters continue extremely light. Commercial yards are busy on manufacturing operations only two days per week. Railroad offerings of interest

to this market were confined to 933 tons by Missouri Pacific and 623 tons by Missouri, Kansas & Texas. Prices are nominally unchanged.

#### Cincinnati

Old materials are quiet. Dealers' bids have apparently touched bottom since no trading in market testing amounts is reported and the trade indicates a refusal to do business at present quotations. Some material is moving on old continuing contracts, but new trading is scarce.

#### Roston

Buying of steel for export at firm and unchanged prices continues the outstanding feature in scrap. Two boats will finish loading at Providence this week, one for Japan and one for Italy, and loading at Boston will be stepped up this week. Local shippers have been advised England has chartered 17 boats to carry approximately 110,000 tons of scrap from the United States to Great Britain for delivery within a few weeks. Some of these boats are scheduled to load at Boston.

#### Toronto

Lower prices featured business in the iron and steel scrap markets for the week with reductions at both Toronto and Montreal ranging from 50c. to 75c. a ton. Local dealers made strong efforts to keep prices up, but with the larger consumers refusing to pay the former prices for old materials they were forced to cut during the week One local dealer stated that one mill in the Hamilton district cut its buying price \$1.10 per ton on purchases the week. Local dealers are unable to account for the present situation and state that demand for most materials is slow. Consumers, while expecting improvement in business, appear reluctant to place contracts for raw materials covering two or three months into the future.

#### New York

Following the placement of large European tonnages earlier in the month, the pace of shipments abroad has been accelerated in the last 10 days. With domestic consumption at low ebb, however, scrap is coming out freely and brokers are having no difficulty in covering at present prices. The Japanese are leading up to their usual month-end purchases, but their offers to buy at last month's levels are being met with some resistance owing to the large European commitments.

#### Detroit

A body company list which closed last week brought prices in line with published quotations and Detroit prices moved sideways for the third successive week, although 25c. and 50c. reductions were made on long turnings and short shoveling turnings, respectively, on the basis of recent prices paid by brokers and yard dealers. Sentiment in Detroit agrees that scrap prices probably are at their bottom level now. Chrysler will close its list Thursday with moderate tonnages offered.

# Iron and Steel Scrap Prices

#### PITTSBURGH

Per gross ton delivered to consu	mer:
No. 1 hvy. mltng. steel.\$14.00 to	14.50
Railroad hvy. mltng 15.00 to	15.50
No. 2 hvy. mltng. steel. 12.50 to	13.00
Scrap rails 15.50 to	16.00
Rails 3 ft. and under 17.00 to	17.50
Comp. sheet steel 14.00 to	14.50
Hand bundled sheets 13.00 to	13.50
Hvy. steel axle turn 12.50 to	13.00
Machine shop turn 9.00 to	9.50
Short shov. turn 9.50 to	10.00
Mixed bor. & turn 6.50 to	7.00
Cast iron borings 6.50 to	7.00
Cast iron carwheels 14.50 to	15.00
Hvy. breakable cast 12.00 to	12.50
No. 1 cupola cast 15.00 to	15.50
RR. knuckles & cpirs. 16.50 to	17.00
Rail coil & leaf springs 17.00 to	17.50
Rolled steel wheels 17.00 to	17.50
Low phos. billet crops. 18.00 to	18.50
Low phos, punchings 17.00 to	17.50
Low phos. plate 16.00 to	17.00

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#### PHILADELPHIA

Per gross ton delivered to consu	mer:
No. 1 hvy. mltng. steel.\$15.00 to	\$15.50
No. 2 hvy. mltng. steel. 12.50 to	13.00
Hydraulic bund., new. 14.50 to	15.00
Hydraulic bund., old 11.00 to	11.50
Steel rails for rolling. 17.00 to	17.50
Cast iron carwheels	16.00
Hvy. breakable cast 14.50 to	15.00
No. 1 cast 16.00 to	16.50
Stove plate (steel wks.)	13.00
Railroad malleable 15.50 to	16.00
Machine shop turn 8.50 to No. 1 blast furnace 6.50 to	
Cast borings 6.50 to	7.00
Heavy axle turnings 10.00 to	10.50
No. 1 low phos. hvy 17.00 to	17.50
Couplers & knuckles 17.00 to	17.50
Rolled steel wheels 17.00 to	17.50
Steel axles 20.00 to	20.50
Shafting 20.50 to	21.00
Spec. iron & steel pipe 12.00 to	12.50
No. 1 forge fire 12.00 to	12,50
Cast borings (chem.) 9.50 to	10.00

#### CHICAGO

Delivered to Chicago distr	ict consi	imers:
	Per Gros	s Ton
Hvy. mltng. steel	\$12.50 to	\$13.00
Auto. hvy. mltng. steel		
alloy free	11.25 to	11.75
No. 2 auto steel	10.50 to	11.00
Shoveling steel	12.50 to	13.00
Factory hundles	12.00 to	12.50
Dealers' bundles	10.75 to	11.25
Drop forge flashings.	9.25 to	9.75
No. 1 busheling	11.25 to	11.75
No. 2 busheling, old	5.25 to	5.75
Rolled carwheels	13.75 to	14.25
Railroad tires, cut	13.75 to	14.25
Railroad leaf springs	14.00 to	14.50
Steel coup. & knuckles	13.50 to	14.00
Axle turnings	11.50 to	12.00
Coil springs	15.50 to	16.00
Axle turn, (elec.)	13.00 to	13.50
Low phos. punchings	15.00 to	15.50
Low phos. plates 12 in.		
and under	14.50 to	15.00
Cast iron borings	6.50 to	7.00
Short shov. turn	6.00 to	6.50
Machine shop turn	6.00 to	6.50
Rerolling rails	16.50 to	
Steel rails under 3 ft	15.50 to	16.00
Steel rails under 2 ft	16.00 to	16.50
Angle bars, steel	15.00 to	15.50
Cast iron carwheels	12.25 to	12.75
Railroad malleable	14.50 to	15.00
Agric. malleable	10.75 to	11.25
	Per N	et Ton
Iron car axles	\$18.00 to	\$18.50
Steel car axles	17.50 to	18.00
Locomotive tires	13.00 to	13.50
Pipes and flues	8.50 to	9.00
No. 1 machinery cast.	11.50 to	
Clean auto, cast	12.50 to	13.00
No. I railroad cast	10.50 to	11.00
No. 1 agric, cast	10.00 to	10.50
Stove plate	7.25 to	7.75
Grate bars	7 75 40	8.25
Brake shoes	9.00 to	9.50

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niate		15 50	10 16	00
hundle		13.75	to 14	.25
hop tu	rn	8.00	to 8	.50
	mltng. mltng. plate heling	mitng. steel. mitng. steel. plate heling	mltng. steel. \$14.50 mltng. steel. 13.50 plate 15.50 heling 13.75	ton delivered to consume mltng. steel.\$14.50 to \$15 mltng. steel. 13.50 to 14 plate . 15.50 to 16 heling . 13.75 to 14 bundles . 14.00 to 14 hop turn . 8.00 to 8

Per gross ton delivered	to co	nsumer:
No. 1 hvy. mltng. steel.	\$13.25	to \$13.75
No. 2 hvy. mltng. steel	12.25	to 12.75
Comp. sheet steel	12.75	
Light bund. stampings	9.50	
Drop forge flashings	11.00	
Machine shop turn	7.00	
Short shov. turn	7.50	
No. 1 busheling	12.75	
Steel axle turnings	10.50	to 11.00
Low phos. billet and		
bloom crops	17.50	
Cast iron borings	7.25	
Mixed bor. & turn	7.25	
No. 1 busheling	12.75	
No. 1 cupola cast	14.50	
Railroad grate bars	8.50	to 9.00
Stove plate	9.00	
Rails under 3 ft	17.25	
Rails for rolling	17.50	to 18.00
Railroad malleable	14.50	to 15.00
Cast iron carwheels	13.50	to 14.00

#### BUFFALO

Per gross ton delivered	to consu	mer:
No. 1 hvy. mltng. steel.	\$13.00 to	\$13.50
Railroad hvy. mltng	13.50 to	14.00
No. 2 hvy. mltng. steel.	11.00 to	11.50
Scrap rails	13.50 to	14.00
New hvy. b'ndled sheets	11.00 to	11.50
Old hydraul, bundles	10.00 to	10.50
Drop forge flashings	11.00 to	11.50
No. 1 busheling	11.00 to	11.50
Machine shop turn	6.00 to	6.50
Knuckles & couplers	15.00 to	15.50
Coil & leaf springs	15.00 to	15.50
Rolled steel wheels	15.00 to	15.50
Shov. turnings	7.00 to	7.50
Mixed bor. & turn	7.00 to	7.50
Cast iron borings	7.00 to	7.50
No. 1 machinery cast	15.00 to	16.00
No. 1 cupola cast	14.50 to	15.00
Stove plate	13.00 to	13.50
Steel rails under 3 ft	18.00 to	18.50
Cast iron carwheels	13.50 to	14.00
Railroad malleable	15.00 to	15.50

# ST. LOUIS

Dealers' buying				ton
delivered	to cor	sum	er:	

delivered to cons	umer:	
Selected hvy. melting.	\$11.75 to	\$12.25
No. 1 hvy. melting	11.50 to	12.00
No. 2 hvy. melting	10.50 to	11.00
No. 1 locomotive tires.	12.25 to	12.75
Misc. stand. sec. rails.		
Railroad springs	14.00 to	14.50
Bundled sheets		7.50
No. 1 busheling	7.50 to	8.00
Cast. bor. & turn		3.00
Machine shop turn		4.00
Heavy turnings	9.00 to	9.50
Rails for rolling	16.00 to	16.50
Steel car axles	17.00 to	17.50
No. 1 RR. wrought	9.75 to	10.25
No. 2 RR, wrought	11.50 to	12.00
Steel rails under 3 ft	16.00 to	16.50
Steel angle bars	13.00 to	13,50
Cast iron carwheels	14.00 to	14.50
No. 1 machinery cast	13.50 to	14.00
Railroad malleable	12.25 to	12.75
No. 1 railroad cast	12.00 to	12.50
Stove plate		8.00
Grate bars	8.50 to	9.00
Brake shoes	9.50 to	10.00

## CINCINNATI

# Dealers' buying prices per gross ton at yards:

me larmer		
No. 1 hvy. mltng. steel.	\$10.50 to	\$11.00
No. 2 hvy. mltng. steel.	8.25 to	8.75
Scrap rails for mltng.	14.00 to	14.50
Loose sheet clippings.	6.00 to	6.50
Hydrau. b'ndled sheets	10.00 to	10.50
Cast iron boring	2.75 to	
Machine shop turn	4.00 to	4.50
No. 1 busheling	6.75 to	7.25
No. 2 busheling	1.75 to	2.25
Rails for rolling	16.00 to	16,50
No. 1 locomotive tires.	12,75 to	13.25
Short rails	16.75 to	17.25
Cast iron carwheels	12.00 to	12.50
No. 1 machinery cast	11.50 to	12.00
No. 1 railroad cast	11.50 to	12.00
Burnt cast	5.75 to	6.25
Stove plate	5.75 to	6.25
Agricul, malleable	10.25 to	10.75
Railroad malleable	12.75 to	13.25
Mixed hvy. cast	9.50 to	10.00

#### BIRMINGHAM

Per gross ton delivered to consu	
Hvy. melting steel\$12.50 to	\$14.00
Scrap steel rails 14.50 to	15.00
Short shov, turnings 7.50 to	
Stove plate 9.00 to	10.00
Steel axles 15.00 to	16.00
Iron axles 15.00 to	16.00
No. 1 RR, wrought	10.00
Rails for rolling 16.00 to	16.50
No. 1 cast	14.50
Tramcar wheels	14.00

#### DETROIT

	s ton:
	\$10.00
8.50 to	9.00
4.50 t	0 5.00
5.00 t	0 5.50
12.50 t	0 13.00
13.00 t	0 13.50
9.00 t	0 9.50
7.50 t	0 8.00
10.50 t	o 11.00
9.50 t	0 10.00
6.75 t	0 7.75
9.00 t	0 9.50
10.50 t	0 11.00
	8.50 tc 4.75 tc 4.50 tc 5.00 tc 12.50 tc 13.00 tc 9.00 tc 7.50 tc 10.50 tc 9.50 tc

# NEW YORK

Dealers buying prices	per g	ross	ton
on cars:			
No. 1 hvy. mltng. steel.	\$11.00	to !	11.50
No. 2 hvy. mltng. steel.	8.50	to	9.00
Hvy. breakable cast	10.50		11.00
No. 1 machinery cast.			12.00
No. 2 cast	9.50	to	10.00
Stove plate	9.50		10.00
Steel car axles	20.00		20.50
Shafting	15.50		16.00
No. 1 RR, wrought	11.00		11.50
No. 1 wrought long	9.50		10.00
Spec. iron & steel pipe			9.50
Rails for rolling	16.00		16.50
Clean steel turnings*	4.00	to	4.50
Cast borings*	3.50	to	4.00
No. 1 blast furnace			4.00
Cast borings (chem.)			10.00
Unprepared yard scrap			6.50
Light iron			3.50
Per gross ton, delivered l			
No. 1 machn. cast†			
No. 2 castf	10.50	to	11.00

\* \$1.50 less for truck loads.
† Northern N. J. prices are \$2 to \$2.50 higher

## BOSTON

Dealers' buying prices per gross	ton:
Breakable cast	\$9.65
Machine shop turn \$3,38 to	\$4.15
Mixed bor. & turn 2.00 to	2,25
Bun. skeleton long	
Shafting 15.25 to	15.50
Cast bor, chemical 4.50 to	5.00
Per gross ton delivered consumers'	yards:
Textile cast\$13.00 to	\$14.00
No. 1 machine cast 13.00 to	
Per gross ton delivered dealers' y	
No. 1 hvy. mltng, steel.\$11.25 to	\$11.50
No. 2 steel 10.00 to	10.25

PACIFIC COAST

Per gross ton delivered to consumer:
No. 1 hvy. mltng. steel. \$12.00 to \$13.00
No. 2 hvy. mltng. steel. 11.00 to 12.90

#### CANADA

Dealers'	buying	prices	at	their	r yards.
	per	gross			
		T	oro	nto l	Montrea

	onto Mo	
No. 1 hvy. mltng. steel.	\$9.25	\$8.75
No. 2 hvy. mltng. steel.	8.00	7.50
Mixed dealers steel	6.75	6.25
Drop forge flashings	8.25	7.75
New loose clippings	4.25	3.75
Busheling	3.75	3,25
Scrap pipe	4.25	3.75
Steel turnings	4.25	3.75
Cast borings	3.75	3.25
Machinery cast	14.00	13.50
Dealers cast	12.00	11.50
Stove plate	10.00	9.50

#### EXPORT

		uying					
New	York,	truck	lots,	del	ivered	1, 1	arges
No. 1	hvy.	mltng	. ste	el.	12.00	to	\$12.50
No. 2	hvy.	mltng	. ste	el.	10.50	to	11.00
No. 2	cast				10.50	to	11.00
Stove						to	10.00

# Boston on cars at Army Base

No. 1 hv.	y, mltng.	steel.	13.75 12.75	to	13.00
	ohia, deliz		longsid		

No. 1 hvy. mltng. steel. \$15.00 to \$15.25 No. 2 hvy. mltng. steel. 13.50 to 13.75

# PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

Steel prices on these pages are base prices only and f.o.b. mill unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases the amount of freight which must be absorbed in order to meet competition.

SEMI-FINISHED STEEL	Philadelphia, del'd 2.15c. New York, del'd2.19c. to 2.29c.	Electrical Sheets (F.o.b. Pittsburgh)
Billets, Blooms and Slabs	On cars dock Gulf ports 2.45c.	Base per Lb
Pittsburgh, Chicago, Gary, Cleve- nd, Youngstown, Buffalo, Birming-	On cars dock Pacific ports 2.60c. Wrought iron plates, P'tg 3.80c.	Field grade
m, Sparrows Point (Rerolling ly). Prices delivered Detroit are	* Subject to concessions, particularly in the	Electrical 4.05c Motor 4.95c
higher. F.o.b. Duluth, billets only, higher.	East, of \$2 a ton.	Dynamo 5.650
rolling	FLOOR PLATES	Transformer 72 6.15c Transformer 65 7.15c
rolling	Pittsburgh or Chicago 3.35c.	Transformer 58 7.65c Transformer 52 8.45c
Sheet Bara	New York, del'd	
Pittsburgh, Chicago, Cleveland, bungstown, Buffalo, Canton, Spar-	On cars dock Pacific ports 3.95c.	Silicon Strip in coils—Sheet price plus sti con sheet extra width extra plus 25c per 10 lb. for coils. Pacific ports add 70c. a 100 ti
ws Point, Md.	STRUCTURAL SHAPES	
en hearth or besse-	Base per Lb.	No. 24 unassorted 8-lb. coating
ner\$34.00	Pittsburgh, Chicago, Gary, Buf-	f.o.b. Pittsburgh or Gary 3.80c F.o.b. ears dock Pacific ports. 4.50c
Skeip Pittsburgh, Chicago, Youngstown,	falo, Bethlehem or Birming- ham	Vitreous Enameling Stock, 20 Gage*
atesville, Pa., Sparrows Point, Md.	Philadelphia, del'd 2.215c.	Pittsburgh, Chicago, Gary,
rooved, universal and	New York, del'd	Youngstown, Middletown or Cleveland 3.35
sheared1.90c.	On cars dock Pacific ports 2.70c.	Cleveland
Wire Rods	STEEL SHEET PILING	Granite City
(No. 5 to 9/32 in.)  Per Gross Ton	Base per Lb.	
ttsburgh, Chicago or Cleve-	Pittsburgh, Chicago or Buffalo 2.40c.	TIN MILL PRODUCTS *Tin Plate
and	On cars dock Gulf ports 2.85c. On cars dock Pacific ports 2.90c.	Per Base Bo
rmingham	- and the second process and the	Standard cokes, Pittsburgh, Chi- cago and Gary\$5.0
ds over 9/32 in. or 47/64 in., in-	RAILS AND TRACK SUPPLIES	cago and Gary
clusive, \$5 a ton over base.	F.o.b. Mill	* Prices effective Nov. 10 on shipmen through first quarter of 1939.
SOFT STEEL BARS	Standard rails, heavier than 60 lb., per gross ton\$40.00	Special Coated Manufacturing Ternes
Base per l.b.	Angle bars, per 100 lb 2.70	Granite City\$4.
ttsburgh, Chicago, Gary, Cleveland, Buffalo and Birm-	F.o.b. Basing Points	Pittsburgh or Gary 4.
ngham	Light rails (from billets) per	Roofing Terne Plate
luth 2.25c	gross ton\$40.00 Light rails (from rail steel) per	(F.o.b. Pittsburgh) (Per Package, 112 sheets, 20 x 28 in
ulladelphia, delivered 2.47c. ew York249c.	gross ton 39.00	9-lb coating IC \$19
ears dock Gulf ports 2.50c.	Base per Lb. Cut spikes 3.00c.	15-lb. coating I.C
a cars dock Pacific ports 2.75c.	Screw spikes 4.55c. Tie plates, steel 2.15c.	25-lb. coating I.C 16.
RAIL STEEL BARS	Tie plates, steel	15-lb. coating I.C. 14.0 20-lb. coating I.C. 15.0 25-lb. coating I.C. 16.0 30-lb. coating I.C. 17.0 40-lb. coating I.C. 17.0
(For merchant trade)	Track bolts, to steam railroads 4.15c.	Black Plate, 29 gage and lighter
ttsburgh, Chicago, Gary, Cleveland, Buffalo, Birming-	Track bolts to jobbers, all sizes (per 100 counts) 65-5	Pittsburgh, Chicago and Gary 3.05
ham	Basing points on light rails are Pittsburgh,	Granite City 3.15 On cars dock Pacific ports,
n cars dock Pacific ports 2.70c.	Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio,	boxed 4.00
LLET STEEL REINFORCING BARS	Welrton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon.	HOT ROLLED STRIP
(Straight lengths as quoted by	ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon,	(Widths up to 12 in.)
distributers)	Pa., Richmond, Va.	Pittsburgh, Chicago, Gary,
ttsburgh, Chicago, Gary, Birmingham, Buffalo, Cleve-	SHEETS	Cleveland, Middletown, Youngstown or Birmingham 2.00
land, Youngstown or Spar- rows Pt 1.80c. to 2.05c.	Hot Rolled	Detroit, delivered 2.10
etroit, delivered 1.90c. to 2.15c.	Pittsburgh, Gary, Birming-	Cooperage Stock
n cars dock Tex. Gulf ports 2.15c. to 2.40c.	ham, Buffalo, Sparrows Point,	Pittsburgh & Chicago 2.10
n cars dock Pacific ports 2.50c.	Cleveland, Youngstown, Mid- dletown or Chicago 2.00c.	From May 10 up to and including May 15, ductins in the base price of hot rolled st
RAIL STEEL REINFORCING BARS	Detroit, delivered 2.10c. Philadelphia, delivered 2.17c.	ductins in the base price of hot rolled strunning from \$4 to \$8 a ton were prevale Concessions withdrawn on May 15.
(Straight lengths as quoted by distributers)	Granite City	COLD ROLLED STRIP*
ittsburgh, Chicago, Gary, Buf- falo, Cleveland, Youngstown	On cars dock Pacific ports 2.50c. Wrought iron, Pittsburgh 4.10c.	Base per la
or Birmingham 1.70c. to 1.90c.		Pittsburgh. Youngstown or Cleveland 2.80
etroit, delivered 1.80c. to 2.00c.	Cold Rolled* Pittsburgh, Gary, Buffalo,	Chicago 2.90
n cars dock Tex. Gulf ports 2.05c. to 2.25c. n cars dock Pacific ports 2.35c.	Youngstown, Cleveland, Mid-	Detroit, delivered 2.90 Worcester 3.00
n cars dock Pacific ports 2.35c.	dletown or Chicago 3.05c. Detroit, delivered 3.15c.	* Carbon 0.25 and less.
IRON BARS	Granite City 3.15c.	Andreas Armer anna anna
hicago and Terre Haute 2.15c. ittsburgh (refined) 3.60c.	Philadelphia, delivered 3.37c. On cars dock Pacific ports 3.65c.	Commodity Cold Rolled Strip Pittsburgh, Youngstown, or Cleveland
COLD FINISHED BARS AND	* Mill run sheets are 10c, per 100 lb, less than	Detroit, delivered 3.00
SHAFTING*	base; and primes only, 25c, above base.	Worcester 3.35
Base per Lb.	ductions from the base price of hot and cold rolled sheets running from \$4 to \$8 a ton were prevalent. Concessions withdrawn, on May 15.	From May 10 up to and including May 15, ductions from the base price of cold rolled st
ittsburgh, Buffalo, Cleveland, Chicago and Gary 2.65c.	prevalent. Concessions withdrawn, on May 15.	ductions from the base price of cold rolled st amounting to \$4 a ton were prevalent. Co cessions withdrawn on May 15.
etroit 2.70c.	Galvanized Sheets, 24 Gage	
* In quantities of 10,000 to 19,999 lb.	Pittsburgh, Chicago, Gary Sparrows Point, Buffalo,	COLD ROLLED SPRING STEEL Pittsburgh
PLATES	Middletown, Youngstown or	and
Pittsburgh, Chicago, Gary,	Birmingham	Carbon 0.26-0.50% 2.80c. 3.00
Birmingham, Sparrows Point,	Granite City 3.60c.	Carbon 0.51-0.75 4.30c. 4.50
Cleveland, Youngstown, Coatesville, Claymont, Del. 2.10c.*	On cars dock Pacific ports 4.00c. Wrought iron Pittsburgh 6.10c.	Carbon 0.76-1.00 6.15c. 6.38 Carbon 1.01-1.25 8.35c. 8.55

#### WIRE PRODUCTS

	44 117	r IIIO	00010	
(Carload cago, Clo	lots, evelan	f.o.b. d and	Pittsburgh, Birmingha	Chi-

To	M	anufa	cturi	ng	T	rad	
				-			Per Lb.
Bright v	wire						2.60c.
Galvania	zed	wire.	base				2.65c.
Spring	wire						3.20c.

\* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price

Nos. 6 to 9 gage, inclusive, thus being 3.13	ic.
To the Trade	
Base per 1	
Standard wire nails\$	2.45
Coated nails	2.45
Cut nails, carloads	3.60
Base per 100	Lb.
Annealed fence wire	2.95
Galvanized fence wire	
Polished staples	3.18
Galvanized staples	3.40

#### STEEL AND WROUGHT IRON PIPE AND TUBING

# Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills F.o.b. Pittsburgh only on wrought

iron	pipe.			
		Butt	Weld	
	Steel		Wrought In	on
In.	Black	Galv.	In. Black	Galv.
1/8 .	56	36	14836+9 +	-30
	0 % .59		1/224	61/2
1/2 :	631/2	54	3430	13
% .	661/2	58	1 & 114.34	19
1 to	3681/2	601/2	11/238	211/2
		-	0 071/	04

%66½ 1 to 368½	58 60½	1 & 1¼.34 1½38 237½	
21/2 & 364	52½ 55½ 57½ 55½ 55½	Weld 230½ 2½ to 3½ 31½ 433½ 4½ to 8.32½ 9 to 1228½	17½ 21 20
		strong, plain   4&3 .+10 +	

	4 & % . +10 +43
1/2 to 3/4.561/2 451/4	1/225 9
1/2611/2 371/2	%31 15
%65 1/2 57 1/2	1 to 238 2214
1 to 367 60	
Lap weld, extra s	strong, plain ends
241 0 0 00 00	001

21/2 & 363 551/2	233 ½ 18 ½ 2½ to 4.39 ½ 25 ½ 4½ to 6.37 ½ 24
7 & 8.651/2 56	7 & 838½ 24½ 9 to 1232 20½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittaburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher, on all butt weld in and smaller.

# 8 in. and smaller. Boiler Tubes Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. (Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots) Lap

			Lap
	Sean	aless	Weld
	Cold	Hot	Hot
	Drawn	Rolled	Rolled
1 in. e.d13 B.W.G.	\$ 9.01	\$ 7.82	
1% in. o.d 13 B W.G	10.67	9.26	
1% in. o.d 13 B.W.G.	11.70	10.23	\$9.72
1% in. o.d13 B.W.G.	13.42	11.64	11.06
2 In. o.d 13 B W G	15.03	13.04	12.38
7% in. o.d 13 R W G	16.76	14.54	13.79
2% in. o.d 12 R W G	18.45	16.01	15,16
2% in. o.d 12 B.W.G	20, 21	17.54	16.58
2% in. o.d12 B.W.G.	31.42	18.59	
3 in. o.d 19 R W G	22.48	19.50	18.35
3 12 in. o.d 11 B.W.G.	98.37	24.62	23.15
	25 20	20 54	28.66
1 1/2 In O.d 10 R W G	43 04	37 35	35.22
~ III. 0.0 9 H W 12	54.01	46 97	44.25
6 in. o.d 7 B.W.G.	82.93	71.96	
Extras for less car			
30,000 lb. or ft. to 39,999	10		Base
20,000 lb. or ft. to 29,999	ID. OF I		5%
10,000 lb. or ft. to 19,999	Ib. or f		200
5,000 lb. or ft. to 9,999	Ib. or I		20%
2.000 lb. or ft. to 4.999	ID. OF I		45%
Under 2,800 th or ft	10. 07 1		. 43%

#### CAST IRON WATER PIPE

Per Nei	Ton
*6-in. and larger, del'd Chicago.	\$51.00
6-in, and larger, del'd New York	49.00
*6-in, and larger, Birmingham.	43.00
6-in. and larger, f.o.b. dock, San	
Francisco or Los Angeles	
F.o.b. dock, Seattle	
4-in, f.o.b. dock, San Francisco	
or Los Angeles	55.00
F.o.b. dock, Seattle	
Class "A" and gas pipe, \$3	extra

4-in. pipe is \$3 a ton above 6-in. Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$42, Birmingham, and \$50 delivered Chicago and 4-in. pipe, \$45, Birmingham, and \$54 delivered Chicago.

# BOLTS, NUTS, RIVETS, SET SCREWS

#### Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland Birmingham or Chicago)

Per Cent Off L	ist
Machine and carriage bolts:	
1/2 in. & 6 in. and smaller 68	11/2
Larger and longer up to 1 in. 66	3
1% in. and larger 64	4
Lag bolts 66	1
Plow bolts, Nos. 1, 2, 3	
and 7	11/2
Hot pressed nuts, and c.p.c.	
and t-nuts, square or hex.	
blank or tapped:	
½ in. and smaller 67	7
9/16 in. to 1 in. inclusive 64	4
1% in. and larger 6:	2

On the above items with the exception of plow bolts, there is an additional allowance of 10 per cent for full container quantities. On all of the above items, there is an ad-ditional 5 per cent allowance for carload ship-

Semi-fin. hexagon nuts		S.A.E.
1/2 in. and smaller		70
9/16 to 1 in	64	65
1% in. and larger	62	62
In full container late	10 -	

In full container lots, 10 per cent additional discount.

Stove bolts				
attached .				721/2
Stove bolts				
nuts separ	ate	721/	and	123/2
Stove bolts				
On stove bolts	freight i	s allowed	te des	stins-
tion on 200 lb.	and over.			

# Large Rivets

( )	z in. and larger)
	Base Per 100 Lb.
F.o.b. Pi	ttsburgh, Cleveland,
Chicago,	Birmingham\$3.40

### Small Rivets

(7/16 in. and smaller)

F.o.b. Pittsburgh, Cleveland Chicago, Birmingham ....65 and 10

### Cap and Set Screws

(Freight allowed to destination)

Per Cent Off List
Milled hexagon head, cap screws,
1 in. dia. and smaller50 and 10
Milled headless set screws, cut
thread % in. and smaller 70
Upset hex. head cap screws U.S.S.
or S.A.E. thread 1 in. and
smaller
Upset set screws, cup and oval
points 75
Milled studs 60

# Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, \$56.00 a gross ton.

Alloy Steel Bars	
F.o.b. Pittsburgh, Chicago, Buffalo,	
Bethlehem. Massillon or Canton.	E
Open-hearth grade, base2.70c.	
Delivered, Detroit2.80c.	Γ
S.A.E. Alloy	
Series Differential	
Numbers per 100 Lb.	
200 (1/2 % Nickel)\$0.35	2

2100 (11/2 % Nickel)\$0.75
2300 (3½% Nickel) 1.55
2500 (5% Nickel) 2.25
3100 Nickel-chromium 0.70
3200 Nickel-chromium 1.85
3300 Nickel-chromium 3.80
3400 Nickel-chromium 3.20
4100 Chromium-molybdenum
(0.15 to 0.25 Molybdenum) 0.55
4100 Chromium-molybdenum
(0.25 to 0.40 Molybdenum) 0.75
4600 Nickel - molybdenum (0.20
to 0.30 Mo. 1.50 to 2.00 Ni.) 1.10
5100 Chrome steel (0.60-0.90 Cr.) 0.35
5100 Chrome steel (0.80-1.10 Cr.) 0.45
5100 Chromium spring steel 0.15
6100 Chromium-vanadium bar., 1.20
6100 Chromium-vanadium
spring steel 0.85
Chromium-nickel vanadium 1.50
Carbon-vanadium 0.85
These prices are for hot-rolled steel bars. The
differential for most grades in electric furnace
steel is 50c, higher. Slabs with a section area of 16 in. and 2½ in, thick or over take the billet
or 10 in. and 272 in. thick or over take the billet

Alloy Cold-Finished Bars F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. base per lb. Delivered Detroit, 3.45c., carlots.

#### CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

#### Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25e.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

#### Straight Chrome

No.	No.	No.	No.
410	430	442	446
Bars . 18,50c.	19c.	22.50c.	27.50e.
Plates 21.50c.	22c.	25.50c.	30.50c.
Sheets 26,50c.	29c.	32.50c.	36,50c.
Hot Strip 17c.	17.50c.	23c.	. 28c.
Cold stp. 22c.	22.50c.	28.50c.	36.50c.

#### TOOL STEEL

High s	pee	d														*			67c.
High-ca	rbe	or	1-	c	h	r	O	I	n	le									43c.
Oil-hard	len	ir	12																24c.
Special								*					*		*				23e.
Extra																			18c.
Regular																			14c.
Delses A			-										4.1	_			91	į.	

Prices for wa on or East of higher. West a lh. higher.

# **British and Continental** BRITISH

Per Gross Ton f.o.b. United Kingdom Ports

Ferromanganese, ex- portNom	nal
Tin plate, per base	
box20s. 3d. to 21s.	6d.
Steel bars, open hearth £10 8s.	
Beams, open-hearth£10	
Channels, open hearth £10 5s.	
Angles, open-hearth£10	
Black sheets, No. 24 gage, £13	
Galvanized sheets, No. 24	
gage£15 15a	

# CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, ThomasNomin	al
Wire rods, No. 5 B.W.G £5 10s.	
Steel bars, merchant £5 5s.	
Sheet BarsNomir	al
Plate ¼ in. and up£5 7s.	
Plate 3/16 in. and 5 mm £5 13s.	
Sheets 1/4 in£5 9s. (	id.
Beams. Thomas£4 18s.	
Angles (Basic)£4 18a.	
Hoops and strip, base£5 12s.	

# **RAW MATERIALS PRICES**

#### PIG IRON

#### No. 2 Foundry

F.o.b. Everett, Mass	22.00
F.o.b. Bethlehem. Birdsboro and	
Swedeland, Pa., and Spar-	
rows Point, Md	99 00
Delivered Brooklyn	24.50
Delivered Newark or Jersey	
City	23.53
Delivered Philadelphia	22.84
F.o.b. Neville Island, Erie, Pa.,	-
Toledo, Chicago, Granite City,	
Cleveland and Youngstown	21.00
	21.00
F.o.b. Buffalo	
F.o.b. Detroit	21.00
Southern, delivered Cincinnati	21.06
Northern, delivered, Cincinnati	21.44
F.o.b. Duluth	21.50
F.o.b. Provo, Utah	19.00
Delivered, San Francisco, Los	
Angeles or Seattle	24 50
F.o.b. Birmingham*	
e.o.b. Diriilinguam	11.00

\* Delivered prices on southern iron for ship-ment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per ent and ower.

#### Malleable

Base prices on malleable from are 56c, a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffale. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable from basing points.

F.o.b. Everett, Mass	21.50
F.o.b. Bethlehem, Birdsboro,	
Swedeland and Steelton, Pa.,	
and Sparrows Point, Md	21.50
F.o.b. Buffalo	20.00
F.o.b. Neville Island, Erie, Pa.,	
Toledo, Chicago, Granite City,	
Cleveland and Youngstown	20.50
Delivered Philadelphia	22.34
Delivered Canton, Ohio	
Delivered Mansfield, Ohio	22.44
F.o.b. Birmingham	16.00
Bassaman	

Dessemel	
F.o.b. Buffalo	\$22.00 23.00
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa	23.00
City	
F.o.b. Neville Island, Toledo, Chicago and Youngstown	21.50
F.o.b. Birmingham	22.11
Delivered Mansfield, Ohio	23.44

															asi	B	
															St		
20.0	 9.5			0	۰		9		.0.						N.		

#### Gray Forge

Valley or Pittsburgh	furnace.	\$20.50
----------------------	----------	---------

Lake Sur	erior	fur	na	ce	}	0			.\$25.00
Delivered	Chic	ago					۰		. 28.34

#### Canadian Pig Iron

Per	Gross	To
4 60	Urvao	* 0

								VI.									
Foundry	7	1	r	D	n		۰		0	0		0		0	1	24.50	base
Malleab	16	3				0								0		25.00	base
Basic .								*						*	*	24.50	base

								r					
Foundry	11	.0	)1	0									\$22.50 base
Malleable										•		*	
Basic				*									. 22.50 base

On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

#### **FERROALLOYS**

Ferromanganese
F.o.b. New York, Philadelphia,
Baltimore, Mobile or New Orleans.

Per Gross Ton Domestic, 80% (carload) .....\$80.00

#### Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.......\$28.00 Domestic, 26 to 28%...... 33.00

#### Electric Ferrosilicon

# Per Gross Ton Delivered; Lump Size

50%	(carload	lots.	bulk)	\$69.50*
50%	(ton lots	in 50	gal. bbl.)	80.50
75%	(carload	lots.	bulk)	126.00
75%	(ton lots	in 50	gal. bbl.)	139.00*

#### Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio Per Gross Ton 10.00 to 10.50% .....\$30.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per

50c. per ton is advect.

for each unit of maganese over 2%, \$1 per ton additional. Phosphorus 0.75% or over, \$1 per ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

# Silvery Iron Per Gross Ton

F.o.b. Jackson,	Ohio,	5.00	to	
5.50%			\$2	4.
For each additiona	1 0.5% 8	Hicon i	os qu	12
50c. a ton is added.	Above 12	% add	75c. a	- 80
The lower all-rail	delivered	price	from	Jac
con or Buffalo is qu	noted with	n freig	ht alle	owe
Base prices at Buffa	lo are \$1	.25 8	ton h	igh
than at Jackson.				
Manganese, each u	nit over :	2%. \$1	a ton	

Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over. \$1 a ton additional.

Per Lb. Carlots,										
4 to 6% c	arbo	n		 						.10.50c.
2% carbon										
1% carbon	1			 						.17.50c.
0.10% car	bon			 						.19.50c.
0.06% car	bon			 	*	*	* *	*	*	.20.00c.

### Silico-Mangan

F	er			livered, Lump Contract
30%	09	rhon	 	\$83

# 3% carbon \$83.00 2.50% carbon 88.00 2% carbon 93.00 1% carbon 103.00

#### Other Ferroalloys

refrotungaten, per ib. con-	
tained W del., carloads	1.75
Ferrotungsten, 100 lbs. and less	2.00
Ferrovanadium, contract, per	
lb. contained V., deliv-	
ered\$2.70 to \$	\$2.90
Ferrocolumbium, per lb. con-	
tained columbium fob NI	

Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., tons lots
Ferrocarbontitanium, 15 to
18% Ti, 7 to 8% C. f.o.b. furnace carload and contract
per net ton \$142.50
Ferrocarbontitanium, 17 to
20% Ti, 3 to 5% C. f.o.b. furnace, carload and contract,
per net ton \$157.50
Ferrophosphorus, electric, or
blast furnace material, in
carloads, f.o.b. Anniston,
Ala., for 18%, with \$3 unitage, freight equalized with
Rockdale, Tenm., per gross
ton \$58.50

Rockdale, Tenn., per gross ton \$58.50

Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, \$3 unitage, freight equalized with Nashville \$75.00

Ferromolybdenum, per lb. Mo. f.o.b. furnace 95c. Calcium molybdate, per lb. Mo. f.o.b. furnace 80c. Molybdenum oxide briquettes 48-52% Mo; per lb. contained Mo, f.o.b. Langeloth, Pa. \$60c.

\* Spot prices are \$5 per ton higher. † Spot prices are 10c, per lb. of contained element higher.

#### **ORES**

# Lake Superior Orea

	Deuverea	Lower			
				Gross.	
	range, B				
	range, no				
	sabi, Bes				
	sabi, non-				
Hig	h phospho	rus, 51.	50%		4.85

#### Foreign Ore

# C.i.f. Philadelphia or Baltimore Per Unit Iron, low phos., copper free, 55 to 58% dry, Algeria ....... 12c.

Iron, low phos., Swedish, aver-	
age, 681/2% iron	12c.
Iron, basic or foundry, Swe-	
dish, aver. 65% iron	11c.
Iron, basic or foundry, Rus-	
sian, aver. 65% ironNon	inal
Man., Caucasian, washed	
52%	29c.
Man., African, Indian,	
44-48%	25c.
Man., African, Indian,	
49-51%	280.
Man., Brazilian, 46 to	
4 <b>9</b> 0/L	270

# Per Short Ton Unit

#### FILIORSPAR

PLUOKSPAK
Per Net Ton
Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois
mines, all rail\$18.00
Domestic, f.o.b. Ohio River
landing barges 19.00
No. 2 lump, 85-5, f.o.b. Ken- tucky and III. mines 19.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f.
Atlantic ports, duty paid 21.50 Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not
over 24% silicon, f.o.b. Illi- nois and Kentucky mines 31.50

## FUEL OIL

						Pe	r Gal
No.	2.	f.o.b.	Bay	onne			3.75c.
No.	6.	f.o.b.	Bay	onne			2,26c.
No.	5	Bur. S	itds.	del'd	Chi	cago	3.25c.
No.	6	Bur. S	tds.,	del'd	Chi	cago	2.750.
No.	3	distilla	ate.	del'd	Clev	re'd.	5.50c.
No.	4	indust	rial.	del'd	Clev	re'd.	5.25c.
No.	5	indust	rial.	del'd	Clev	re'd.	3.00c.
No.	6	indust	rial,	del'd	Cle	ve'd.	2.75c

#### COKE

00112	
Per Ne	To:
Furnace, f.o.b. Connells- ville, Prompt Furnace, f.o.b. Connells-	\$3.71
ville, Prompt\$4.75 to	5.56
Foundry, by - product, Chicago ovens	10.2
Foundry, by - product, del'd New England	12.50
Foundry, by - product, del'd Newark or Jersey	
City10.88 to Foundry, by - product,	11.40
Philadelphia	10.9

Philadelphia 10.95
Foundry, by - product,
delivered Cleveland ... 10.30
Foundry, by - product,
delivered Cincinnati ... 9.75
Foundry, Birmingham ... 7.56
Foundry, By - product,
del'd St. Louis indus,
trial district ... 10.75 to 11.00
Foundry, from Birmingham ... 10.05
Foundry, from Birmingham ..

# IRON AND STEEL WAREHOUSE PRICES

IROP	AND STEEL WAREHOUSE PRI	CES
PITTSBURGH*	ST. LOUIS	PHILADELPHIA
Plates 3.40c. Shapes 3.40c.	Plates and structural shapes. 3.47c. Bars, soft steel (rounds and	*Plates, ¼-in. and heavier 3.40c. *Structural shapes 3.40c.
Soft steel bars and small shapes 3.35c. Reinforcig steel bars	flats) 3.62c. Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	*Soft steel bars, small shapes, iron bars (except bands) 3.60c Reinforc steel bars, square and deformed 2.61c
stock	Cold fin. rounds, shafting, screw stock	Cold-finished steel bars 4.11c. *Steel hoops 4.10c. *Steel bands, No. 12 and 3/16
Galv. sheets (24 ga.) 500 lb. to 1499 lb	Hot rolled sheets	in. incl
Wire, galv., soft	Structural rivets 5.02c.  * No. 26 and lighter take special prices.  BOSTON	†Galvanized sheets (No. 24) 4.43c. †Diam. pat. floor plates, ¼ in 5.00c. These prices are for delivery in Fhiladelphia trucking area.
On plates, structurals, bars, strip and hot rolled sheets, base applied to orders of 400 to 1999 lb. On reinforcing bars base applies to orders of less than one ton and includes switching and	Structural shapes, 3 in. and larger 5,85c.	*For quantities between 400 and 1999 lb. †For 10 bundles or over.
earting charge. All above prices for delivery within the Pitta- ourgh switching district.	larger 5.85c. Plates, ¼ in. and heavier 3.85c. Bars 3.98c. Heavy hot rolled sheets 3.86c.	‡For one to five tons.  BIRMINGHAM
NEW YORK	Hot rolled sheets	Bars and bar shapes 3.50c.
Plates, ¼ in. and heavier 3.76c. Structural shapes 3.75c.	Cold rolled sheets 4.93c.  The following quantity differentials apply: Less than 100 lb., plus	Structural shapes and plates 3.45c. Hot rolled sheets No. 10 ga 3.40c. Galvanized sheets No. 24 ga 4.75c.
Soft steel bars, round 3.84c. fron bars, Swed. charcoal 7.50 to 8.25c. Cold-fin, shafting and screw	\$1.50 per 100 lb.; 100 to 399 lb. plus 50c.; 400 to 1999 lb. base; 2000 to 9999 lb. minus 20c.; 10,000 to 39,999 lb.	Strip
stock: Rounds, squares, hexagons 4.09c. Flats up to 12 in. wide 4.09c.	minus 30c.; 40,000 lb. and over minus 40c.  BUFFALO Plates 3.77c.	Cold finished bars 4.73c. Machine and carriage bolts
cold-rolled strip, soft and quarter hard	Floor plates 5.40c. Struc. shapes 3.55c.	On plates, shapes, bars, hot-rolled strip heavy hot-rolled sheets, the base applies on 400 to 3999 lb. All
*Hot-rolled sheets (8-30 ga.) 3.40c. Galv. sheets (24 ga.) 4.50c. Long ternes (24 ga.) 5.50 to 6.20c. Cold-rolled sheets (20 ga.)	Soft steel bars	prices are f.o.b. consumer's plant.
Standard quality 4.60c. Deep drawing 4.85c.	Cold-fin. flats, squares, rounds, and hex	San Base per Lb.
Stretcher leveled       5.10c.         SAE, 2300, hot-rolled       7.35c.         SAE, 3100, hot-rolled       5.30c.	to 48 in. wide incl. also sizes No. 8 to 30 ga 3.50c. Galv. sheets (24 ga.) 4.50c.	Fran- eisce Angeles Seattle Plates, tanks and U. M 3.60c. 4.00c. 3.49c
SAE, 6100, hot-rolled annealed. 8.75c. SAE, 2300, cold-rolled 8.59c. SAE, 3100, cold-rolled, an-	Bands and hoops 3,97c.  NEW ORLEANS  Base per Lb.	Shapes, standard 3.60c. 3.90c. 3.55c. Soft steel bars. 3.55c. 4.00c. 3.65c. Reinforcing bars,
realed 8.19c. Floor plate, 1/4 in. and heavier 5.43c. Standard tool steel12.50c. Wire, black, annealed (No. 9). 4.65c.	Mild steel bars	f.o.b. cars dock Pacific ports 2.275c. open. 2.375c Hot-rolled sheets
Wire, galv. (No. 9) 5.00c. Open-hearth spring steel	Plates	(No. 10) 3.45c. 4.05c. 3.80c. Galv. sheets (No. 24 and lighter) 5.15c. 4.75c. 4.75c.
Common wire nails, per keg in 25 keg lots \$2.90	Cold-finished steel bars 5.10c. Structural rivets 4.35c. Boiler rivets 4.85c.	Galv. sheets (No. 22 and heavier) 5.40c. 4.75c. 4.75c. Cold-finished steel
*For lots less than 2000 lb.	Common wire nails, base per keg	Rounds 6.55c. 6.60c. 7.10c. Squares and hexagons 7.80c. 7.85c. 7.10c.
CHICAGO  Base per Lb.	REFRACTORIES PRICES	Flats 8.30c. 8.35c. 8.10c Common wire nails—base per keg less carload \$3.00 \$2.85 \$3.00
Plates and structural shapes 3.55c. Soft steel bars, rounds and angles 3.50c.	Fire Clay Brick Per 1000 f.o.b. Works Super-duty brick, at St. Louis.\$60.\$0	All items subject to differentials for quantity.
angles	Super-duty brick, at St. Louis. \$60.30 First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	ST. PAUL Base per Lb
Hot rolled sheets 3.35c.	First quality, New Jersey 52.50 Second quality, Pennsylvania, Maryland, Kentucky, Missouri	Mild steel bars, rounds       4.10c         Structural shapes       4.00c         Plates       4.00c         Cold-finished bars       4.83c
Cold rolled sheets	and Illinois	Hot-rolled annealed sheets, No. 24 4.75c Galvanized sheets, No. 24 5.00c
f.o.b. consumer's plant within Chicago free delivery zone.	Ground fire clay, per ton 7.10 Silica Brick Per 1000 f.o.b. Works Pennsylvania	On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, gal-
CLEVELAND  Base per Lb.	Chicago District	vanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000
Structural shapes 3.40c. Structural shapes 3.58c. Soft steel bars 2.50c	Chrome Brick Net per Ton Standard f.o.b. Baltimore, Plym-	lb. and over of a size.  DETROIT: Base per Lb.
Cold-fin. bars (1000 lb., over). 3.75c. Hot-rolled strip	outh Meeting and Chester\$47.00 Chemically bonded f.o.b. Balti- more, Plymouth Meeting and	Soft steel bars
Cold-finished strip	Chester, Pa	Floor plates
ler 5.33c	Chester	in. to 48 in. wide 3.43c. Cold-rolled sheets 4.50c. Galvanized sheets 4.74c
No. 9 galv. wire, per 100 lb 3.50 on the second	Grain Magnesite  Net per Ton  Imported, f.o.b. Baltimore and	Hot-rolled strip, under No. 12. 3.68c. Hot-rolled strip, No. 12 and over
For 5000 lb. or less.	Chester, Pa. (in sacks)\$45.00 Domestic, f.o.b. Baltimore and Chester in sacks 40.00 Domestic, f.o.b. Chewelah,	Cold-rolled strip 3.55c. Hot-rolled alloy steel (SAE 3100 Series) 5.97c.
Prices shown on hot rolled bars, strip, sheets, shape sand plates are for 400 to 1999 lb. Allow deel, 1000 lb, and over; galvanized sheets, 159 to 1499 lb.; cold rolled sheets, 396 lb. and under.	Domestic, f.o.b. Chewelah, Wash. (in bulk) 22.00	Cold rolled alloy (SAE) 2300) 8.45c.  Quantity extras apply to all items.
the street, and is, and under.		deminent harman abbid on sen reduce.

# FABRICATED STEEL

. . . Lettings slightly higher at 12.850 tons as against 10,350 tons last week . . . New projects advance to 20,300 tons from 16,300 tons a week ago . . . Plate awards total 2020 tons.

# NORTH ATLANTIC STATES AWARDS

- AWARDS

  1210 Tons, Portsmouth, N. H., Navy Yard, shipfitters' shop, to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.

  800 Tons, Buffalo, Kleinhans Music Hall, to Buffalo Structural Steel Co., Buffalo.

  600 Tons, Niagara Falls, N. Y., units for Great Lakes Coal & Coke Co., to Bethlehem Steel Co., Buffalo.

  520 Tons, New York, freight terminal, 12th Avenue, to American Bridge Co., Pittsburgh.

  400 Tons, Grafton, Vt., State bridges, to American Bridge Co., Pittsburgh.

  380 Tons, Clifton, N. J., four bridges, route 6 sections 8 and 9, to American Bridge Co., Pittsburgh.

  310 Tons, Brooklyn, sanitation garage,

- sanitation 310 Tons Tons, Brooklyn, sanitation garage, Georgia Avenue, for Procurement Division, Treasury Department, to Bethlehem Steel Co., Bethlehem, Pa.

  Tons, New York, Columbia Broadcasting Co., 49 East 52nd Street, to Lehigh Structural Steel Co., Allentown, Pa.

  Tons, Mountain View, N. J., railroad bridge, to American Bridge Co., Pittsburgh. Brooklyn.
- burgh.
  Tons, Elizabeth, N. J., apartment building for Elizabeth Housing Authority, to

- ing for Elizabeth Housing Authority, to an unnamed fabricator.

  265 Tons. Blossburg, Pa., foundry building for J. P. Ward Co., to Milton Steel Co., Milton, Pa.

  250 Tons. Marlboro-Newfane, Vt., State bridges, to American Bridge Co., Pitts-burgh.

  245 Tons. Queens. N. Y., service building and garage, Queens-Midtown Tunnel, to Harris Structural Steel Co., Plainfield, N. J.
- N. J. Tons, Guildford Halifax, Vt., State bridges, to American Bridge Co., Pitts-

- bridges, to American Bridge Co., Pittsburgh.

  200 Tons, Goshen, Bridgewater and Jamaica, Vt., State bridges, to Bethlehem Steel Co., Bethlehem, Pa.

  180 Tons, Storrs, Conn., heating plant for State College, to Haarman Steel Co., Holyoke, Mass.

  150 Tons, Katonah, N. Y., grade and high school, to Weatherly Structural Steel Co., Weatherly, Pa

  115 Tons, Poughkeepsie, N. Y., Arlington High School, to Utica Structural Steel Co., Utica, N. Y.

  100 Tons, Queens, N. Y., Queens Plaza-Midtown Tunnel, to American Bridge Co., Pittsburgh.
- Pittsburgh.

  100 Tons, Allentown, Pa., Lehigh-Portland
  Cement building, to Lehigh Structural
  Steel Co., Allentown.

#### THE SOUTH

- THE SOUTH
  Tons, Elkin, N. C., finishing plant for Chatham Mfg. Co., to Bethlehem Fabricators, Inc., Bethlehem, Pa.
  Tons, Warren County, Tenn., bridge, to an unnamed fabricator.
  Tons. Marian County, W. Va., bridge, to Fort Pitt Bridge Works Co., Pittsburgh.

#### CENTRAL STATES

- State College, to R. C. Mahon Co.
- for State College, Co. Detroit.

  Tons, Indianapolis, factory building for Allison Division of General Motors Corp., to Austin Co., Cleveland.

  Tons, St. Paul. Minn., Jackson Street bridge, to Bethlehem Steel Co., Bethle
- Tons, St. Finander Steel Co., bridge, to Bethlehem Steel Co., bridge, to Bethlehem Steel Co., Tons, Brighton, Ohio, rebuilding Chesapeake & Ohio Railway Co. bridge, to American Bridge Co., Pittsburgh. Tons. Center Grove, Iowa, State bridge FAGH-305-C, to Clinton Bridge Co., Clinton Iowa.

  Neb., State viaduct, to Evans.
- Tons, Ralston, Neb., State viaduct, to International Steel & Iron Co., Evans-
- ville, Ind.

  175 Tons, Cleveland, Hankins Container Co.
  factory, to Ingalls Iron Works Co..
  Verona, Pa., through Gillmore, Carmichael & Olson Co., Cleveland.

- 140 Tons, West Frankfort, Ill., refuse rescreener plant, to Pan American Bridge Co., Newcastle, Ind.
  115 Tons, State of North Dakota, underpass FAGH-137F, to Minneapolis-Moline Power Implement Co., Minneapolis.

#### WESTERN STATES

- 400 Tons, San Francisco, Best Foods ware-house, to Judson-Pacific Co., San Fran-
- cisco.

  213 Tons, Oakland, Cal., Chrysler plant, to
  Bethlehem Steel Co., San Francisco.

  120 Tons, Mare Island, Cal., radio towers,
  to Minneapolis-Moline Power Implement
  Co., Minneapolis.

#### PENDING STRUCTURAL PROJECTS NORTH ATLANTIC STATES

- PENDING STRUCTURAL PROJECTS
  NORTH ATLANTIC STATES
  6090 Tons, Brooklyn, Shore Road parkway viaduct.
  2500 Tons, Jersey City, N. J., Nurses Home, Medical Center.
  800 Tons, Bridgeport, N. J., State bridge over Raccoon Creek; bids close June 2.
  800 Tons, South Orange, N. J., gymnasium and auditorium for Seton Hall College.
  800 Tons, Pittsburgh, incinerator plant.
  650 Tons, New York, Airways Terminal building for unnamed owner.
  550 Tons, Linden, N. J., midget auto racing track, Northern New Jersey Oil Co.
  560 Tons, Tottenville, N. Y., grade crossing eliminations for Staten Island Rapid Transit Co.
  530 Tons, Bridgeport, Conn., Klein Memorial auditorium.
  530 Tons, Springfield, Mass., office building for G. & C. Merriam Co.
  200 Tons, Northumberland, N. H., State bridge over Ammonoosuc River.
  200 Tons, Trenton, N. J., apartment building and garage.
  175 Tons, Wilmington, Del., department store for S. S. Kresge Co.
  175 Tons, Springfield, Mass., sewerage treating plant.
  170 Tons, Wilmington, Vt., State bridges.
  150 Tons, Port Richmond, N. Y., addition to high school.
  150 Tons, Shady Gap, Pa., Tuscarora Mountain Tunnel for Pennsylvania Turnpike

- high school. 150 Tons, Shady Gap, Pa., Tuscarora Mountain Tunnel for Pennsylvania Turnpike

- Commission.

  150 Tons, Meadville, Pa., building for Montgomery Ward & Co.

  125 Tons, Orono, Me., residence hall for women, University of Maine.

  100 Tons, Huntington, Vt., East Street bridge.

#### THE SOUTH

- 1500 Tons.
- 1500 Tons, Oklahoma City, six highway bridges; bids May 27. 175 Tons, Arlington County, Va., building Globe Parking Stores, Inc. CENTRAL STATES

- CENTRAL STATES

  800 Tons, State of Illinois, highway bridges; bids June 2.

  500 Tons, Leavenworth, Kan., four highway bridges; Ottinger Brothers, Leavenworth, low bidders on general contract.

  600 Tons, Cordova, Iowa, State bridges.

  300 Tons, Adams County, Ohio, State bridge over Rush Creek.

  225 Tons, Chicago Heights, Ill., warehouse and factory, Montgomery Ward & Co.; bids May 31.

  175 Tons, Norwood, Ohio, alterations and additions to assembly building for Chevrolet Motor Division, General Motors Corp. rolet Corp.
- 125 Tons, Lima, Ohio, bridge over Ottawa
- River.
  125 Tons, Lake Leelanau, Mich., beam spans.
  125 Tons, Scott Field, Ill., completion of hangar and annexes.

#### WESTERN STATES

- 500 Tons, Santa Monica, Cal., Douglas air-craft assembly plant; bids in. Unstated tonnage, Los Angeles, 200-ton gan-try crane for Department of Water and

#### FABRICATED PLATES AWARDS

- 1200 Tons, Elwood, Neb., pipe, to Chicago Bridge & Iron Co., Chicago. 675 Tons, Hyattsville, Md., Washington Sub-urban Sanitary District, 30-in. water pipe, to Alco Products Co., Dunkirk,
- urban pipe, to Alco Product.
  N. Y.

  145 Tons, Holtwood, Pa., steel barge, Pennsylvania Water & Power Co., to Lancaster Iron Works, Lancaster, Pa.

  Caster Iron Works, Lancaster, Dam: bids

# 1200 Tons, Seattle, Mud Mountain Dam; bids

unstated tonnage, Warren, Ohio, 1,145, gal. standpipe for city; bids June 1,

# SHEET PILING

PENDING PROJECTS

250 Tons, Ellenville, N. Y., contract 341,
Delaware Aqueduct; bids close June 6,

1756 Tons, Los Angeles, H-bearing piles for
United States Engineer; bids May 29,

# Machines Made Jobs, Stettinius Says

WASHINGTON—The statement that modernization of mills by the United States Steel Corp. had brought about a 25 per cent reduction in employees at the affected plants, made last week before the Temporary National Economic Committee, was described this week by Edward R. Stettinius, Jr., board chairman of the corporation, as "not as full and complete" an answer "as it should have been to tell the true story."

Mr. Stettinius said in a letter to Chairman O'Mahoney of the TNEC that "although labor-saving machines. where introduced in the corporation's plants, do displace hand-labor and turn out more products per hour with a smaller number of operators than was formerly the case, the fact is that the installation of labor-saving machinery has not resulted in a reduction of the number of employees as a whole." He asked that the letter be made a part of the record.

"At corresponding rates of operation the subsidiaries of the Steel Corporation are employing more men at higher rates of pay and with shorter hours of work than ever before in its history," the letter said. "For example, in 1929, when the corporation produced over 15,000,000 tons of rolled and finished steel products, it employed 254,138 men whose average earnings were \$31.69, the average number of hours worked being 46 hr. per week; in 1937, when production was less than 13,000,000 tons, the corporation employed 261,293 men whose average earnings were \$32.51, the average number of hours worked being 38 hr.

Chairman O'Mahoney, who during the course of Mr. Stettinius' testimony asked what effect modernization had on number of workers employed, inserted the letter in the record at Monday's session this week.

# ...NON-FERROUS...

... Moderate copper demand at 10c. level . . . Spelter sales taper to 2790 tons . . . Heavy lead call forces sellers to dip into reserves . . . Tin buying very light.

EW YORK, May 23—Although foreign political tension abated somewhat in the past week, traders generally felt that there were still no signs of an enduring agreement being reached between the various factions. This belief acted to keep the week's sales volume at a very moderate level, the over-all total probably being slightly below that of the preceding week. The low London prices con-

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tinue to act as a ceiling over prices here, and undoubtedly much of the current buying of lead and zinc may be attributed to the feeling among American consumers that the prevailing domestic prices on these two metals are "bargains." Copper demand at the 10c. level was very weak all week and even the shading of this price in the open market failed to excite any interest. For the month through Saturday,

domestic sales amount to 39,854 tons. Export sales have been going along at a fairly even rate, supported chiefly by the armament programs of the European nations. This morning's foreign business was done in the neighborhood of 9.95c. per lb., c.i.f., usual base ports, as compared with 10.05c. a week ago.

#### Zinc

Prime Western sales declined again last week, the period's total of 2790 tons comparing with 3346 in the previous week and 7640 tons three weeks Spelter consuming operations, notably galvanizing, appear to be holding fairly steady and the week's decrease in buying is interpreted as indicating that the market is approaching the usual few weeks of quiet, which will probably be followed by a burst of heavy buying. The past week's shipments were 3330 tons, against 3911 tons in the preceding week. The domestic price, which at present is wholly controlled by the London quotation, is naturally very firm at 4.89c, a lb., New York. As this price is considered unprofitable by American producers, there is very little pressure for sales.

#### Lead

The bulk of current activity in nonferrous metals centers on the lead market. The past week's sales were close to 30 per cent above the previous week, and on several occasions sellers were forced to dip into reserves to accommodate demands. Practically all of May needs have been covered, but over half of June requirements have yet to be bought. The April statistics, showing shipments at 38,000 tons, indicate that activities in the lead fabricating industries in that month was comparatively unchanged from the preceding three months of this year. The domestic price continues unchanged at 4.75c. per lb., New York, with both sellers and buyers studying the London exchange closely for guidance as to the future movement of prices here. Spot metal in London this morning was priced at 2.99c. per lb. against 3.07c. a week ago.

#### Tin

The market was extremely quiet all the past week, even the usual small lot business being absent. Yet despite the dull demand, prices ruled fairly steady, due primarily to sellers' reticence toward selling at present levels. For most of the past week, Straits held at 48.80c. per lb., New York, but today eased off to 48.70c. Spot supplies are still tightly held. On first call in London this morning, cash standards were priced at £225 5s.

#### **NON-FERROUS PRICES**

#### Cents per lb. for early delivery

	May 17	May 18	May 19	May 20	May 22	May 23
Copper, Electrolytic <sup>1</sup>	10.00	10,00	10.00	10.00	10.00	10.00
Copper, Lake	10.00	10,00	10.00	10.00	10.00	10.00
Tin, Straits, New York	48.875	48.80	48.80		48.00	48.70
Zinc, East St. Louis <sup>2</sup>	4.50	4.50	4.50	4.50	4.50	4.50
Lead, St. Louis <sup>3</sup>	4.60	4.60	4.60	4.60	4.60	4.60

<sup>1</sup>Delivered Conn. Valley, deduct ½c. for New York delivery. <sup>2</sup>Add 0.39c, for New York delivery. <sup>3</sup>Add 0.15c, for New York delivery.

#### Warehouse Prices

## Cents per lb., Delivered

Ne	w Vork C	lavaland
Tin, Straits pig		
Copper, Lake		
Copper, electro		
Copper, Castings		
*Copper sheets, hot-		
rolled		18.12c.
*High brass sheets		
*Seamless brass tubes	19.23c.	19.23c.
*Seamless copper tubes.	18.62c.	18.62c.
Brass rods	11.85c.	11.85c.
Zinc slabs	6.15c.	6.90c.
Zinc sheets, No. 9 casks	10.50c.	12.10c.
Lead, American pig	5.75c.	5.60c.
Lead, bar		
Lead, sheets, cut	8.00c.	8.00c.
Antimony, Asiatic	15.00c.	17.00c.
Alum., virgin, 99 per		
cent plus	22.50c.	22.50c.
Alum., No. 1 remelt., 98		
to 99 per cent	19.50c.	19.50c.
Solder, 1/2 and 1/2	29.375c.	29.75c.
Babbitt metal, commer-		
cial grade	21.50c.	21.75c.

\*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3; on brass sheets and rods, 40, and on brass and copper tubes, 25.

#### Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.75c.	9,50c.
Copper, hvy. and wire.	6.75c.	7.25c.
Copper, light and bot-		
toms	6.00c.	6.25c.
Brass, heavy	4.125c.	4.625c.
Brass, light	3.25c.	4.00c.
Hvy. machine compo-		
sition	6.00c.	7.50c.
No. 1 yel. brass turnings	4.00c.	4.50c
No. 1 red brass or com-		
pos. turnings	5.75c.	6.375c.
Lead, heavy	3.625c.	4.50c.
Cast aluminum	6.50c.	7.753.
Sheet aluminum	12.25c.	13.75c.
Zine	2.125c.	3.375c.

## Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered; virgin, 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt, New York; Asiatic, 14c. a lb., f.o.b.; American, 11.75c. a lb. Quicksilver, \$86-\$88 per flask of 76 lb. Brass INGOTS, commercial 85-5-5-5, 10.25c. a lb.

# PLANT EXPANSION AND EQUIPMENT BUYING

# **♦ NORTH ATLANTIC** ▶

Joseph E. Seagram & Sons, Inc., 405 Lex-agton Avenue, New York, distiller, has let general contract to Ferro Concrete Construc-tion Co., 203 West Third Street, Cincinnati, for multi-story addition to distilling plant at Lawrenceburg, Ind., for expansion in dryer division, also improvements in several plant units. Cost close to \$100,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, Detroit, are architects and engineers.

Insuline Corp. of America, Inc., 23 Park Place, New York, manufacturer of electrical and radio equipment and parts, has leased about 12,000 sq. ft. of floor space in building at 30-30 Northern Boulevard, Long Island City. for plant.

Consolidated Edison Co. of New York, Inc. description of about one-half of steam-generating equipment in power plants from powdered fuel to oil operation, with installation of oil burners and system, controls and accessory equipment, and steel tank storage and distribution facilities.

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until June
1 for steel castings requirements from July 1 Dec. 31, 1939 (Circular 59467).

Payne & Walsh Corp., 82 Beekman Street. New York, printing machinery and parts, has leased about 25,000 sq. ft. of floor area in adjoining building at 84-90 Beekman Street, for rebuilding and reconditioning cylinder presses, parts production, etc., with part of-space for storage and distribution. Present such works at 34-12 Thirty-sixth Avenue, Long Island City, will be removed to new

location and capacity increased.

Signal Corps Procurement District, Base, Fifty-eighth Street and First Avenue Brooklyn, asks bids until May 29 for coils contacts, capacitors, resistors, fuse links, meters and other equipment (Circular 260); until June 2, 12,000 to 18,000 ft. of cable (Circular 245); until June 7, 26,400 ft. of three-conductor, rubber-insulated, lead-covered land cable (Circular 247), 112,150 ft. of cable and 113 reels (Circular 248).

Ramsey Chain Co., Broadway, Albany, N. Y., chain transmissions, couplings, gray iron castings, etc., plans rebuilding part of foundry recently destroyed by fire. Loss close to \$40,-

000 with equipment. Bureau of Supplies and Accounts, Navy De partment, Washington, asks bids until June 1 for roller assemblies and roller spindles (Schedule 6317) for Brooklyn and Philadeltwo motor-driven portable phia Navy yards; turning turret track machines (Schedule 6348); until June 6, one motor-driven hacksav (Schedule 6356) for Brooklyn yard.

International Harvester Co., 180 North Michigan Avenue, Chicago, has let general contract to Wilcox Construction Co., Inc., 25-20 Forty-first Avenue, Long Island City, one-story factory branch, service and dis ributing plant for motor truck division at Northern Boulevard and Thirty-fifth Avenue, Long Island City. Cost about \$140,000 with equipment. New York offices are at 570 West Forty-second Street.

Quartermaster, West Point, N. Y., asks bids until June 1 for a crane, hoist and auxiliary equipment in new ordnance and engineering oratory (Circular 955-74).

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until May 31 for one stacking and weighing machine for 81-mm. propelling charges (Circular 838), one acid pump, two centrifugal pumps and one water neutralization system (Circular 839), two motor-driven automatic multiple-spindle screw machines and six sets of tooling (Circular 771), 48 steel parallels (Circular 840), gages, including flush pin, plain plug, chamfer, adjustable snap, posi-tion, etc. (Circular 843); until June 2 five agitating equipments for blending and poaching (Circular 781), reworking about 12,000 lb. of light brass fuze parts (Circular 788).

Bowers Battery Mfg. Co., Reading, Pa.,

electric storage batteries and parts, proved plans for one-story addition to plant at Spring Valley, near Fleetwood, Pa. to \$85,000 with equipment.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until June 6 for eight milling machines (Cir-

# **■ BUFFALO DISTRICT**

Genesee Brewing Co., 100 National Street. Rochester, N. Y., has let general contract to Saucke Brothers Construction Co., 82 Saranac Street, for one-story addition, 50 x 160 ft.. largely for a mechanical-bottling division. Cost over \$50,000 with equipment. Clarence Damuth, 311 Alexander Street, is architect.

Kilian Mfg. Co., 107 North Franklin Street, Syracuse, N. Y., manufacturer of ball bearings, casters, etc., has plans for one-story addition, 175 x 180 ft. Cost over \$75,000 with equipment. Merton E. Granger, Empire Building, is architect.

Bradson Oil Co., 15 Alice Street, Binghamton, N. Y., plans new bulk oil storage and distributing plant on Court Street, with tanks and other facilities. Cost close to \$50,000. D. W. Jones, Exchange Building, is architect.

# **♦ SOUTH ATLANTIC** ▶

Quartermaster, Fort Screven, Ga., asks bids until June 9 for three cast iron heating boilers, valves, pressure tanks, unions, nipples and other equipment (Circular 826-31).

Bureau of Supplies and Accounts, Navy De-partment, Washington, asks bids until June 2 for one motor-driven precision-type bench lathe (Schedule 6325) for Pensacola, Fla., Naval Air Station: one motor-driven engine lathe (Schedule 6342) for Charleston, S. C., Navy Yard.

Purchasing and Contracting Officer, Quartermaster Corps, Fort Benning, Ga., asks bids until May 29 for unit heaters, heating cabinets, floor furnaces, etc. (Circular 148-135).

Department of Interior, Bureau of Public Works, San Juan, Puerto Rico, asks bids until June 14 for pumping plant and equipment for local graving dock. Plans and specifications at office noted or Bureau of Yards and Docks, Navy Department, Washington. (Fund of \$135,000 is available for this contract.)

# ◀ NEW ENGLAND ▶

Procter & Gamble Co., Gwynne Building. Cincinnati, soaps, washing powders, edible oils, etc., has let general contract to James Stewart & Co., Statler Building, Boston, and 230 Park Avenue, New York, for new branch plant at Quincy, Mass., where about 10-acre tract was acquired recently. It will consist of a main six-story unit, 120 x 325 ft., and smaller structures, with power house, machine when and other mechanical departments. Cost shop and other mechanical departments. Cost close to \$1,000,000 with machinery. R. M. Rice is architect and Henry Manley, consulting engineer, both 655 Fifth Avenue, New

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 1 for about 1700 high-pressure steel globe and angle valves, and 2100 forged-steel high-pressure globe and angle valves (Schedule 6360); until June 2, one motor-driven turret lathe (Schedule 6341) for Boston Navy Yard;

five motor-driven turret lathes and equipment

(Schedule 6352) for Newport, R. I., yard.
V. La Rosa & Sons, Inc., 473 Kent Avenue
Brooklyn, food products, has asked bids or
general contract for new two-story plant, 8 x 400 ft., at Danielson, Conn. Cost over \$100. 000 with equipment. Leo F. Caproni, 122 Chapel Street, New Haven, Conn., is architect.

International Silver Co., State Street, Meri. den, Conn., has let general contract to H. Wales Lines Co., Meriden, for two-story power ouse at local plant, 50 x 60 ft. Cost close \$50,000 with equipment.

Stanley Works, 195 Lake Street, New Brit-ain, Conn., will ask bids soon on two-story and basement plant addition. Maxwell Moore and Charles Salsbury, 967 Farmington Ave. nue, West Hartford, Conn., are architects.

# WASHINGTON DIST. >

Chemical Warfare Service, Edgewood Ar-senal, Edgewood, Md., asks bids until June 13 for three mixing machine bins, three charcoal and soda lime mixture bins and six absorbent bins (Circular 411), six conveyors and 8 belts for conveyors (Circular 408); until June 14, six drying and ventilating systems (Circular 408) cular 413).

Julien P. Friez & Sons, Division of Ber Aviation Corp., 4 North Central Avenue, Balti-more, manufacturers of aeronautical and other scientific instruments and parts, have low bit on general contract from Consolidated Engi-neering Co., 20 East Franklin Street, for new plant at Towson, Md., on 18-acre will comprise main one-story structure, 80 x 400 ft., with wing extension, 100 x 100 ft. and smaller units. Cost about \$500,000 with equipment. Glidden & Baldwin, 513 North equipment. Glidden & Baldwin, 513 North Charles Street, are architects; Whitman Requardt & Smith, West Biddle and Charles

streets, are engineers, both Baltimore.

General Purchasing Officer, Panama Canal.

Washington, asks bids until June 1 for galvanized barbed wire, 20,000 lb. of galvanized soft steel wire, 54,000 lb. of steel wire nais. steel machine bolts, galvanized boat spike, flat head bolts, malleable iron chain for elevator buckets, brass bolt, brass nuts, steel rivets, plate washers, wire rope, phosphor bronze tiller rope, brass pipe, copper pipe, galvanized steel eye and ring bolts, snap hooks, galvanized iron or steel chain shackles galvanized turnbuckles and other equipm (Schedule 3468).

Hauswald Bakery, 2816 Edmondson Avenue Baltimore, has let general contract to A Kratz & Son, 2208 Chelsea Terrace, for one story addition, 52 x 100 ft. Cost about \$45,000 with ovens, conveyors and other mechanics

Bureau of Supplies and Accounts. Navy De partment, Washington, asks bids until June I for carbon molybdenum steel tubing (Schedule 6318) for Boston, Charleston and Puget Somi Navy yards; steel wire nails (Schedule 6267). Navy yards; steet wire nails (Schedule 280), dies, tapathreading sets, diestocks, tap wrenches, et (Schedule 6281) for Eastern and Wester yards; until June 2, one precision power revolving table, 10-ft. square (Schedule 633) for Washington yard; until June 6, two stress collecting furneces (Schedule 6339) for New 1997 for New 2016 (Schedule 6339) for New 2016 (S relieving furnaces (Schedule 6359) for Not folk yard.

# **♦ SOUTH CENTRAL** ▶

B. F. Goodrich Co., Akron, Ohio, automo bile tires and tubes, etc., has asked bids of general contract for new branch mill st general contract for new branch mill st Clarksville, Tenn., comprising several one and multi-story units for production of mechanical rubber goods. Cost close to \$1,500,666 with equipment.

Liquid Carbonic Corp., 627 Felicity Street Liquid Carbonic Corp., 627 Felicity Street.
New Orleans, bottling and brewing machinery, parts, etc., has let general contract to Carl E. Woodward, Inc., Louisiana Buildingfor one-story addition and improvements in present local plant. Cost close to \$45,000 with equipment. Main offices are at 3100 South Kedzie Avenue, Chicago.

City Council, Columbus, Miss., asks bids until May 29 for extensions and improvements.

in municipal electrical distribution system. Cost about \$40,000. Beard Engineering Co.. 2906 Oakview Terrace. St. Louis, is consult-

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J. P. Roddy Mfg. Co., 204 Morgan Street. Knoxville, Tenn., beverages, plans new one and two-story branch mechanical-bottling plant at Morristown, Tenn., superstructure to begin early in June. Cost close to \$45,000 with

# **♦** SOUTHWEST ▶

Wackman Welded Ware Co., 2412 South Seventh Street, St. Louis, manufacturer of steel barrels, drums, etc., has taken option on tract of land in Goosport district, Lake Charles, La., for new branch plant, consisting f main one-story unit, about 100 x 600 ft., and smaller structures, with power house. Cost

and smaller structures, with power house. Cost about \$100,000 with equipment. City Council, Osborne, Kan., plans exten-sions and improvements in municipal electric power plant, including additional equipment. Cost over \$45,000.

Public Terminal Elevator Co., Wichita, Kan. has approved plans for new grain elevator with capacity of 400,000 bu. Cost over \$65,-000 with elevating, conveying, screening and other mechanical equipment. Samuel P. Wallingford is head.

Wabash Railway Co., Railway Exchange Building, St. Louis, plans one-story addition to local engine house and shops at 6700 East Second Street, 40 x 150 ft. Cost over \$50,000 with equipment. J. F. Nellis, address noted. is company engineer.

J. S. Abercrombie Co., Gulf Building, Houston, Tex., has let general contract to Stearn-Rogers Co., same address, for new oil extraction plant at properties in Old Ocean district. Cost close to \$50,000 with equipment.

H. E. Butt Grocery Co., 2021 Mestina Street. Corpus Christi, Tex., will take bids soon on general contract for new one-story baking plant, 100 x 400 ft., on Robstown Road, part of space to be used for bulk storage and distribution. Cost over \$60,000 with ovens, mixers, conveyors, loaders and other mechanical equipment.

Shell Oil Corp., Shell Building, Houston, Tex., has let general contract to J. D. Bace Corp., 4009 Center Street, for additions to oil refinery in Galena district, including onestory pilot plant, laboratory and other units. Cost about \$85,000 with equipment. Costal Chemical Co., Harlingen. Tex., in-

dustrial chemicals, recently acquired by new interests, headed by F. E. Smith, plans one-story addition for storage and distribution, to replace a structure destroyed by fire several months ago. Cost close to \$40,000 with equip-

# ■ WESTERN PA. DIST. ▶

Construction Service, Veteran's Administra-tion, Washington, asks bids until June 20 for boiler house equipment and accessories at in-stitution at Pittsburgh.

American Viscose Corp., 200 Madison Avenue, New York, viscose rayon products, has let general contract to John P. Pettyjohn Co., 212 Eighth Street, Lynchburg, Va., for five one-story additions to branch mill at Nitro, W. Va. One of units will be used for a machine shop, and others for laboratory and production service. Cost over \$125,000 with equipment. Ballinger Co., 105 South Twelfth Street, Philadelphia, is architect. United States Engineer Office. Huntington. W. Va., asks bids until June 8 for pumping machinery and auxiliary equipment for pumping stations on Fifth Avenue. Sixteenth and Twentieth Streets, including station construction.

# OHIO AND INDIANA

Hobart Mfg. Co., Troy, Ohio, electric dishwashing machines and other domestic electric equipment, has let general contract to Austin Co., Cleveland, for two one-story additions. Cost over \$60,000 with equipment.

Purchasing and Contracting Officer, District Quartermaster. CCC. Fort Hayes, Columbus. Ohio, asks bids until May 31 for chain bolts. 40,200 lb. of nails, coil springs, turnbuckles, hooks and eyes and other equipment (Circular nooks and eyes and other equipment (Circular 5502-109); 14,000 ft. of armored cable connectors, 20,000 ft. of weatherproof electric wire, 70,000 cable clips, 70,000 ft. of armored cable, switches and other equipment (Circular 5500).

Swan Rubber Co., East Mansfield Street. Bucyrus, Ohio, rubber hose, molded rubber products, etc., has let general contract to S. A. Schieber & Son, Bucyrus, for two one-story additions. Cost about \$50,000 with equipment.

additions. Cost about \$50,000 with equipment. Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until May 29 for 10,000 aircraft bolts, 16,000 clevis bolts and 1400 eye bolts (Circular 1055), 40,000 ft. of extra flexible cable (Circular 1053); until May 31, lamp cap assemblies and 144,000 ignition cable markers (Circular 1054), drain batteries for hydraulic tank and relief tube, and clip battery drain vent and relief tubes (Circular 1069); until June 1, 399 portable electric drills (Circular 1064), about 5000 open end wrenches (Circular 1065), metal folding drill holders (Circular 1065), metal folding drill holders (Circular 1063).

Rea Magnet Wire Co., Pontiac Street, Fort Wayne, Ind., manufacturer of electrical wire and cable, has let general contract to Indiana Engineering & Construction Co., Old First Bank Building, for one-story addition, 90 x 120 ft. Cost close to \$50,000 with equipment.

Board of Public Works, Richmond, Ind., is

considering extensions and improvements in municipal electric power plant, including new 15,000-kw. turbo-generator unit and auxiliary equipment. Cost over \$175,000.

# ■ MICHIGAN DISTRICT ▶

Chrysler Motor Parts Corp., Detroit, affiliated with Chrysler Corp., 341 Massachusetts Avenue, has asked bids on general contract for one-story factory branch, storage and distributing plant at San Leandro, Cal., where 10-acre tract recently was acquired. Cost close to \$150,000 with equipment. Albert Kahn. Inc., New Center Building, Detroit, is architect and engineer.

Lapeer Metal Products Co., Lapeer, Mich recently organized to manufacture metal stampings, assembled metal goods, etc., has acquired former local building of Lapeer Trailer Corp. for new plant. It is proposed to have works ready for operation early in July. Fred W. Beyers is one of heads of new company.

## **■ MIDDLE WEST**

Arrow Match Co., 3033 West Grand Avenue. Chicago, manufacturer of book matches, plans new plant in Proviso Township, Cook County, near Chicago, comprising eight one and two-story units, including power house and ma-chine shop. Cost about \$150,000 with equip-

Chicago Flexible Shaft Co., 5600 West Roosevelt Road, Chicago, flexible shafts, electric household equipment, etc., has let general contract to Campbell, Lowrie & Lautermilch Corp., 400 West Madison Avenue, for two-story and basement addition, 45 x 335 ft. Cost over \$100,000 with equipment.

Signal Corps Procurement District, 1819
West Pershing Road, Chicago, asks bids until
June 9 for reel units, 60 gasoline engines,
spare parts for gasoline engines and other
equipment (Circular 105).

Hawkeys Stat Products Co. 201

Hawkeye Steel Products Co., 324 Duryea Street, Waterloo. Iowa. is considering one-story addition. 38 x 200 ft., work to be carried out during summer. Cost close to \$45,000 with contracts. with equipment.

Construction Service, Veterans' Administra-tion, Washington, asks bids until June 13 for elevated steel water tank and tower for institution at Knoxville, Iowa.

City Council, Woodbine, Iowa, plans new municipal electric power plant. It is proposed to use diesel engine-generators and accessories. Bond issue of \$115,000 has been authorized.

International Spring Co., 220 North Washtenaw Avenue, Chicago, has asked bids on general contract for one-story top addition, 40 x 75 ft. Cost close to \$40,000 with equipment. M. E. Zaldokas, 1908 Division Street, is archi-

tect.

Elliott & Co., Thirty-seventh Avenue West and Oneota Street, Duluth, Minn., meat packers, have asked bids on general contract for plant addition, comprising several one-story units. Cost over \$75,000 with equipment. Henschien, Everds & Crombie, 59 East Van Buren Street, Chicago, are architects and environment.

# **♦ PACIFIC COAST** ▶

Ryan Aeronautical Co., San Diego, Cal., airplanes and parts, has let general contract to Walter Trepte, 631 Ninth Avenue, for new one-story plant, 200 x 275 ft., adjoining local air base of United States Coast Guard, for parts production and assembling. A traveling crane will be installed. Cost about \$100,000 with equipment. Edward C. and Ellis W. Taylor, 803 West Third Street, Los Angeles, are architects.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until June 14 for one 50-ton diesel-electric revolving jib crane mounted on steel pontoons for Mare Island Navy Yard (Specifications 8975).

Board of Education, Bakersfield, Cal., plans one-story addition to vocational shop at high school on Fourteenth Street. Cost about \$90.-000 with equipment. Charles H. Biggar, Haber-

felde Building, is architect.

North Coast Walnut Growers' Association.

Kelseyville, Cal. L. H. MacIntire, secretary.

has asked bids on general contract for onestory and basement packing plant, 90 x 120

ft. Cost close to \$75,000 with conveyors, loaders and other mechanical equipment, includ-ing storage bins with capacity of 300 tons. Albert C. Martin, Higgins Building, Los Angeles, is architect.

Day & Night Water Heater Co., Shamrock Avenue and Foothill Boulevard, Monrovia, Cal., has let general contract to Herbert A. Hamm, 579 North Holliston Avenue, Pasadena, Cal.. for one-story galvanizing unit. Cost close to \$40,000 with equipment.

close to \$40,000 with equipment.

Bureau of Supplies and Accounts, Navy
Department, Washington, asks bids until June
1 for about 230,000 lb. of copper-nickel alloy
condenser tubes (Schedule 6299) for Mare
Island and Puget Sound Navy yards; until
June 2, one motor-driven engine lathe and
spare parts (Schedule 6292), galvanized plow
steel. wire rope towing hawsers (Schedule
6200), until June 1, best and flarm resistant. steel wire rope towing hawsers (Schedule 6300); until June 6, heat and flame resistant marine use cable (Schedule 6331), 16 motordriven circulating centrifugal pumps (Schedule 6320), two gypsy winches, with electrical and mechanical spare parts (Schedule 6337), for Mare Island yard; 62,400 ft. of insulated electric cable (Schedule 6326), insulated elec tric wire (Schedule 6327) for Puget Sound yard.

Acting Administrator, Bonneville Project. Department of Interior, Portland, asks bids until May 29 for insulated cable for power substations of Bonneville transmission system.

# **♦** FOREIGN ▶

Rolls-Royce, Ltd., Nightingale Road, Derby. Rolls-Royce, Ltd., Nightingale Road. Derby. England, automobiles, airplane engines, parts, etc., has arranged with Air Ministry. Government of England, London, for construction of large plant near Glasgow, Scotland, for manufacture of aircraft engines for Government. It will comprise one and multi-story units for parts production and assembling, with facilities for employment of about 10,000 men for initial operations. Cost over \$20,000,000, which will be financed by company through Government. through Government.

International Nickel Co. of Canada, Ltd., 25 King Street West, Toronto, Ont., plans ex-tensions and improvements in smelting plant at Port Colborne, Ont. Cost close to \$325,000

# THIS WEEK'S MACHINE ... TOOL ACTIVITIES...

... Automotive buying one of the chief sustaining factors ... Immediate outlook encouraging ... Activities in the East still centered on aircraft and Army and Navy buying.

# Increased Sales of Drilling Machinery Noted

INCINNATI - Except for a better drilling machinery demand, the local tool market is without noticeable change. Makers of radial and upright drills indicate a modest but encouraging revival of demand, with support about equal between local and foreign buyers. No large orders are reported, but the total of single drill purchasers is heavier. Some automotive purchasing for undisclosed amounts of lathes, millers and broachers is noted, while general buying in these types continues in fair volume. Boring planers and shapers continue in good demand. As heretofore pointed out, the foreign demand continues to give about half the market support, but the domestic demand shows indications of expansion.

Factory operations are averaging close to 60 per cent. A five-day week with night shifts is being maintained in some plants.

# Summer Outlook Bright In the Middle West

CHICAGO—Sellers of machine tools in the Chicago area are looking forward to reasonably good business over the summer. The automobile industry's prospects for early production of 1940 models is, of course, an important factor in this sentiment. Several railroads have lists pending, and the International Harvester Co. is preparing proposals for its Mil-waukee tractor engine plant, and its tractor works in Chicago. The Electro-Motive Corp., La Grange, Ill., continues an active buyer, and has a good backlog of orders for diesel-electric passenger and switch engines. Sales of small tools over the past week or so have been on an upward trend, which, if the index rule still holds, indicates future improvement in machine tools sales as well.

# Chief Support Coming From Auto and Aircraft Makers

CLEVELAND — The automotive and aircraft industries are the mainstays of the machine tool market, which continues moderately active from the standpoint of orders. Recent sales include equipment for a Salem, Ohio, plant, a Port Clinton plant, and numerous other single machine orders. Such companies as Ford, Chrysler, Wilcox-Rich, a Detroit gear company, and others have been active. Chevrolet at Toledo recently placed drilling equipment as part of the expansion which included orders for broaching machines several weeks ago. Toledo and Cleveland dealers shared liberally in the

business. Inquiries include radial drills, lathes and shapers. All in all, this month is a little more active than had been expected.

Cleveland Pneumatic Tool Co. has purchased land at Burbank, Cal., and is understood to be planning the erection of a plant there. The company makes airplane landing gear struts, as well as air driven tools.

# Approach of Change-Overs Hastens Machine Shipments

DETROIT—Tool and die shops have reached the peak of activity, with a great deal of pressure put on them to complete dies and duplicate sets by the third week in June for several automobile companies. New equipment is being lined up ready to move into plants as departmental shutdowns spread in anticipation of change-overs to 1940 models. Ford is to install new surface finishing equipment for the outer diameters of axles at the wheel end to form a surface

for bearing races. Pontiac has recently installed surface finishing equipment on the pinion gear job. Buying continues on the Buick-Oldsmobile transmission and quasi-official opinion is that the new Detroit plant will not operate until later in the season, the shift to be made after new models are underway. The Ford tractor program scheduled for June has been held up until the 50 units assembled in May have undergone field tests, but some parts manufacturers are continuing to tool up.

# Order Pace Slackens In the East

NEW YORK—What a week ago appeared to be a pick-up in general industrial buying completely disappeared in the last week. Orders in the last 16 days came from very limited sources or were non-existent. One dealer, for example, reported practically all his volume from arsenals and the various Navy yards, which continue to issue new lists almost daily; another indicated the bulk of sales this month coming from aircraft engine and parts makers. A third dealer reported practically no activity. Certain classes of machinery like automatics and hardly selling at all, except in the smaller sizes of screw machines. The situation in the East has therefore reverted to the status current in the earlier part of the year when most orders for machine took could be traced to direct or indirect Government sources, either for aircraft, Navy work or armaments. The fact that inquiries from general industrial sources have also fallen off indicates that the local market will remain unchanged for

#### . . . GREAT BRITAIN . . .

# . . . Steel works increasingly busy in England and on the Continent.

LONDON, May 23 (By Cable)—
Price announcements in Great
Britain for July to October caused
little criticism beyond the 5s. reduction on hematite which compels producers to heavily write down large
unsold stocks and tends to make consumers defer acceptance before July.

All steel works are very busy, mainly on Government work and merchant shipbuilding, and lack of exports is immaterial.

The Continent reports a continued steady advance in business, especially for national defense of democracies in Europe and overseas. Commercial demand is also broadening. There is good demand for tin plate, and, as tin bar prices will remain unchanged till the end of October, there is little prospect of a price reduction. With tin cost rising, a price advance is more probable. Meanwhile business is being done at up to 1s. 6d. base over the

schedule. Unfilled orders amount to about 5,000,000 base boxes.

Black and galvanized sheet makers are fully occupied on home defense orders. August to September will be the earliest export shipments acceptable. Some mills are restarting after 10 years of idleness. Galvanized steel output in the United Kingdom for March was 78,400 tons.

The Australian Government has decided to refer to the Tariff Board the Broken Hill proposal to erect a timplate works.

# Imports at Philadelphia

PHILADELPHIA—The following iron and steel imports were received here during the past week: 3300 tons of chrome ore from Cuba and 1804 tons of chrome ore from South Africa; 650 tons of pig iron from India; 21 tons of steel billets, 14 tons of wire rods, 38 tons of steel tubes and 19 tons of steel bars from Sweden; 10 tons of steel bars, one ton of steel bands and nine tons of structural shapes from Belgium.